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Inspections of Interstate Commercial Vehicles 1996



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**Office of Motor Carrier
and Highway Safety**

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Federal Highway Administration Office of Motor Carrier and Highway Safety

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HIGHLIGHTS OF THE 1996 REPORT

1996 OVERVIEW

- 1.69 million driver-vehicle safety inspections were conducted on interstate commercial motor carriers in Calendar Year 1996. (Inspections on vehicles operated by intrastate carriers are not reflected in these statistics.)
- 4 million violations-and 708,000 out-of-service violations-were detected during the year.
- Three out of four inspections contained violations of the Federal Motor Carrier Safety Regulations, Hazardous Materials Regulations, or comparable State codes.
- One out of four inspections ended with the vehicle or driver being placed out-of-service.
- On average, 237 violations-and 42 out-of-service violations-were detected per 100 inspections.
- 66.4 percent of violations involved safety defects in the vehicle.
- Defects in brakes, lighting, and tires accounted for 39.5 percent of all violations.
- 97.9 percent of all inspections were performed using one of three methodologies: Level I (Full Inspections) 4 1.6 percent; Level II (Walk-Around Inspections) 36.4 percent; Level III (Driver-Only Inspections)---19.9 percent.
- For the five-year period 1992- 1996, interstate inspection activity increased 29.6 percent, while the number of violations detected increased by 20.8 percent.
- From 1992-1996, the mean number of violations detected per 100 inspections decreased from 255 to 237; out-of-service violation rates went from 60 to 42.

CARRIER AND VEHICLE ATTRIBUTES

- Nine in ten inspections in 1996 were attributable to carriers identified by the Office of Motor Carrier and Highway Safety.
- Of the 15 1,960 known carriers who were inspected, 87.1 percent were inspected 10 times or less during the year; 1 .0 percent had over 100 inspections apiece.
- Known carriers were inspected, on average, 9.7 times each during the year.
- Seven in ten inspections where carrier type was discernible involved for-hire carriers.
- 44.8 percent of inspections where fleet size was known involved carriers operating 50 power units or less.
- Smaller carriers had consistently higher violation rates than did larger carriers. For example, carriers operating fewer than 11 vehicles experienced, on average, 279 violations per 100 inspections; carriers with over 5,000 vehicles had, on average, 142 violations.
- Four in five inspections involved tractor-trailers, mostly singles.

- As the number of units comprising an inspected vehicle increased, violation rates went up slightly: straight trucks—231 violations per 100 inspections; singles-240; doubles-265. (The pattern did not hold for triples which had a violation rate of 228.)
- Buses were represented in 1.4 percent of all inspections, but experienced just 0.8 percent of all violations. Buses had the lowest violation rate of any vehicle group whereas the violation rate for all vehicle types was 237 per 100 inspections, the rate for buses was 131.
- Less than one out of ten inspected vehicles was transporting hazardous materials at the time of the inspection; on average, 41 hazardous materials violations were detected per 100 HAZMAT inspections. The overall vehicle-and-driver violation rate for inspections where hazardous materials were present was lower (191 violations per 100 inspections) than the rate for inspections where hazardous materials were not present (239).
- More inspections were performed in warmer weather than colder weather – for instance, 25.8 percent more inspections occurred in Summer than Winter. Spring and Summer inspections tended to result in higher violation rates than Autumn and Winter inspections.
- 81.9 percent of all inspections were conducted between 6 AM and 6 PM, with the heaviest concentration of activities occurring before noon.
- Daytime inspections produced 20.0 percent higher violation rates than did nighttime inspections.
- The average inspection was 29.1 minutes in length.
- Longer inspections resulted in the citation of more violations.
- Level I (Full Inspections), of all the inspection methodologies, produced the highest violation rates per hour of inspection activity.

THE INSPECTION ENVIRONMENT

- All 50 States, plus the District of Columbia, participated in the 1996 national inspection program.
- Inspections were variously conducted at *fixed* and *mobile* facilities.
- Inspections at mobile facilities tended to result in higher *vehicle*, *driver*, and *hazardous materials* violation rates.

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INTRODUCTION

This document presents aggregate statistics derived from the 1996 *Interstate Motor Carrier Inspection Database*. The database was compiled from the records of driver-vehicle inspections conducted during Calendar Year 1996 by State and Federal officials responsible for commercial motor vehicle safety. The database is maintained by the Office of Motor Carrier and Highway Safety (OMCHS), Federal Highway Administration, U.S. Department of Transportation.

This publication is intended to be used by individuals and organizations desiring general information on the safety fitness of interstate commercial carriers, as measured by driver-vehicle inspections conducted under the auspices of the *Motor Carrier Safety Assistance Program* (49 U.S.C. 350 and 355). Readers seeking general information will usually find that the materials in this document satisfy their basic data needs. Persons requiring more specialized information should contact the OMCHS directly.

Scope of the Report

In 1996, State and Federal officials conducted 1,956,665 inspections of commercial vehicles engaged in interstate or intrastate commerce. This report, however, covers only those inspections of vehicles of carriers engaged in *interstate* commerce. "Interstate carriers" are defined to include (1) carriers who sometimes or always operate in interstate or foreign commerce, and (2) carriers of hazardous materials who operate in interstate, intrastate, or foreign commerce. A total of 1,689,069 inspections-or 86.3 percent of all

inspections performed during the year-were determined to involve interstate carriers.

This report is limited to those data elements collected during driver-vehicle inspections and furnished to the OMCHS. Many States collected additional information beyond what was mandated by the OMCHS and used the data to satisfy specialized State requirements; these specialized data elements were never furnished to the OMCHS. Thus, this document reports only those essential data elements commonly collected by all participants in the national inspection program.

This report provides a general overview of 1996 inspection activity, including aggregate summaries of inspection outcomes, identification of major defects identified during the inspection process, and the examination of key variables which appear to influence inspection outcomes. The report *does not* contain information about specific trucking firms, and it *does not* include information, such as the identification of individual drivers, protected by data privacy rules.

Nearly all 1996 inspections were conducted by State personnel. A few, however, were performed by Federal staff. This document reports the results of interstate inspections conducted both by State and Federal officials.

Driver-Vehicle Inspections of Interstate Carriers

The Federally-funded *Motor Carrier Safety Assistance Program* (MCSAP) provides grants to States, the District of Columbia, and U.S. Territories for the conduct of commercial vehicle safety enforcement activities. In 1996, all States and Territories participated in MCSAP during all or part of the year except for the Northern Marianas and the Virgin Islands. The principal agency responsible for commercial vehicle safety varied from State to State, but typically included one of the following: the State Police or Highway Patrol, State Department of Transportation, or State Public Utilities Commission.

Driver-vehicle inspections are the primary enforcement activity performed under MCSAP. Inspections are conducted in accordance with standards developed by the Commercial Vehicle Safety Alliance (CVSA) in cooperation with the OMCHS. These standards establish national uniform inspection procedures and criteria for identifying violations of the *Federal Motor Carrier Safety Regulations* (49 CFR 382, 383, 387, and 390-399) and the *Hazardous Materials Regulations* (49 CFR 170-177). The standards include specification of out-of-service (OOS) violations, which preclude operation of a commercial vehicle by its driver (1) for a prescribed period of time, or (2) until specific vehicle defects are corrected or other conditions met.

Five different types of inspections are conducted under MCSAP. The five types are:

- **Level I: North American Standard (NAS) Inspection.** The most comprehensive and thorough of the inspection types, Level I also normally takes the longest to administer. This inspection technique involves extensive vehicle checks—including under-the-vehicle measurement of brake performance—and examination of hours-of-service logs. In this report, Level I inspections are referred to as *Full Inspections*.
- **Level II: Walk-Around Driver-Vehicle Inspection.** Level II follows most procedures of the NAS inspection except those actions which can only be accomplished by climbing underneath the vehicle (e.g., to measure brake performance). In this report, Level II inspections are referred to as *Walk-Around Inspections*.
- **Level III: Driver-Only Inspection.** Level III examines only the driver-related aspects of the NAS inspection, including compliance with commercial drivers' licensing (CDL) requirements, medical certifications and waivers, and the hours-of-service regulations. In this report, Level III inspections are referred to as *Driver-Only Inspections*.
- **Level IV: Special Study Inspection.** Level IV is an ad hoc examination of particular items, usually inspected in support of a particular study or verification/refutation of a specific trend. Unlike Inspection Levels I-III, this level does not normally connote a distinctive inspection methodology per se—in practice, the methodology employed tends to vary from one special study to the next. Consequently, few analytic conclusions can be made about the data at this level since the inspection technique is not consistent across the category. In this report, Level IV inspections are referred to as *Special Studies*.

- **Level V: Terminal Inspection.** Level V is an examination of vehicles at carriers' terminal facilities. Although the inspection methodology employed may vary, an inspection similar to the Level I technique, but without the "driver" component, is generally used. Terminal Inspections normally focus only on the "vehicle" aspects of the inspection process. In this report, Level V inspections are referred to as *Terminal Inspections*.

Most inspections are conducted at permanent State Commercial Vehicle Weigh-In Facilities. But inspections are also performed at other locations, including mobile inspection sites, carrier terminals, and parking lots.

Data Processing

In 1996, most inspection results were recorded on hardcopy State inspection reports. The reports were then forwarded to central State locations where they were entered into the SAFETYNET database. SAFETYNET is a State-based information system supporting the collection, processing, and analysis of commercial carrier safety data. Edit checks in SAFETYNET were used to ensure the general accuracy and consistency of inputs. Following completion of all edit procedures, and preliminary determination of carriers' State and USDOT Numbers, all inspection records pertaining to interstate carriers were uploaded to the OMCHS mainframe computer in Washington, D.C. (The USDOT Number is a unique carrier identifier used to keep track of inspection and other safety records associated with a given carrier.)

In 1996, more and more states started using ASPEN. ASPEN, a pen-enabled computer system developed by OMCHS' Field Systems Group (FSG), allows inspectors to enter data directly into a pen-based or laptop computer at the roadside. The data are then transferred via AVALANCHE (the bulletin board system) to the SAFETYNET computer for integration into the main inspection database.

On the mainframe, additional edit checks were performed, final determinations of USDOT Numbers were completed, and the inspection records were loaded into the 1996 *Interstate Motor Carrier Inspection Database*.

To compile this annual report, USDOT Numbers in the Inspection Database were used to establish links to the *Motor Carrier Census Database*, which contains general descriptive information (fleet size, annual miles traveled, etc.) for each of the commercial carriers regulated by the OMCHS. Links could not be created for inspection records to which USDOT Numbers were not appended, and thus not all records in the 1996 inspection database could be associated with specific carriers. However, where counts of inspections and inspection outcomes were not specific to any carrier, all records were included-regardless of whether the records contained USDOT Numbers.

General Approach

This report provides *snapshots* of 1996 inspection activity. It chronicles key patterns and trends in the 1996 data and, when appropriate, engages in rudimentary data analysis. The report is written for a broad audience, including readers not necessarily schooled in the technical subject matter. Consequently, the report conscientiously avoids the use of most formal statistical terms and techniques.

Data in the report are presented as succinctly as possible. When only raw numbers or percentages are shown, effort is made to provide enough information so that readers with specialized needs can calculate some of the data not provided.

Major concepts employed in this report include the following:

- Raw *counts* of inspection activity are widely displayed. This is the report's primary "quantitative" measure.
- Inspection *outcomes* are calculated and compared in the form of *violation rates*, i.e., the number of violations detected per 100 vehicle inspections. Distinctions are drawn between *general violation rates*, which are calculated for all violations identified, and *OOS violation rates*, which are calculated on those violations resulting in vehicles or drivers being placed out-of-service. "Violation rates" is one of the report's primary "qualitative" measures.
- An index, called the *violation-to-OOS violation ratio*, is used to assess the *severity* of violations. The ratio gauges the proportion of violations that resulted in the issuance of out-of-service citations. Lower ratios usually mean that more severe violations were identified. The "violation-to-OOS violation ratio" is another of the report's "qualitative" measures.
- Violations are broken down into specific defect categories: *vehicles*, *drivers*, *hazardous materials*. In this report, defects pertaining to the physical truck are always credited to the "vehicle"; defects pertaining to the operator are always credited to the "driver"; and defects involving hazardous materials

are always attributed to the "hazardous materials" category.

- Five specific defects are used throughout the report to illustrate violation patterns generally. The five defects are: *brakes*, *lighting*, *hours-of-service*, *placarding*, and *shipping paper*. Two of the defects pertain to the vehicle, one is a driver defect, and two are hazardous materials defects. The five specific defects were selected because they represent the most prevalent violations within each of the defect categories.

These concepts are examined in greater detail in the body of the report.

Organization of the Document

This report moves from a *general* discussion of inspection activities and outcomes to a more detailed assessment of the *internal* (carrier and vehicle) factors that influence inspection outcomes and concludes with an examination of the *external* (environmental) factors which affect these outcomes.

The topics are explored in three chapters as follows:

- **Chapter 1: 1996 Overview**
- **Chapter 2: The Impact of Carrier and Vehicle Attributes**
- **Chapter 3: The Impact of the Inspection Environment**

Within each chapter, data are organized under and specific topics. A glossary of terms and a depiction of common vehicle configurations are presented in the Appendix.

Data Conventions

The following conventions are used throughout this document:

- Percentages shown in tables and figures are rounded to the nearest one-tenth or one-hundredth of one percent, as appropriate. Percentages do not always total “100” due to rounding.
- Items in inspection records that were left blank or that were too varied to group into meaningful categories are noted in tables and figures under categories labeled “Other,” “Unidentified,” etc..
- When the size of the sample from which data in a given figure were drawn is not readily apparent, the sample size is identified at the base of the figure. For example, “N=1,689,069” means that the data shown were drawn from 1,689,069 inspection records.

Additional Information

For responses to questions not addressed in this publication, please contact the Federal Highway Administration, Office of Motor Carrier and Highway Safety, HMIA, 400 Seventh Street, SW., Washington, D.C. 20590. The telephone number is 202-366-4023.

CHAPTER 1

1996 Overview

Inspection Totals Violation Counts Summary of Defects Five-Year Trends

Nearly 1.69 million driver-vehicle inspections were conducted on interstate motor carriers in Calendar Year 1996. Three out of four inspections contained violations, and one out of four inspections involved one or more out-of-service violations. Collectively, the inspections resulted in the detection of over 4 million violations and nearly 708,000 out-of-service violations; this equates to an average rate of 237 violations-and 42 out-of-service violations-per 100 inspections. Nearly seven out of ten violations detected during inspections involved vehicle defects, indeed, brake, lighting, and tire violations together accounted for 39.5 percent of all violations. From 1992-1 996, interstate carrier inspection activity increased nearly 29.6 percent. Over the five-year period, the mean number of violations detected per 100 inspections decreased from 2.55 to 237; out-of-service violation rates decreased from 60 to 42.

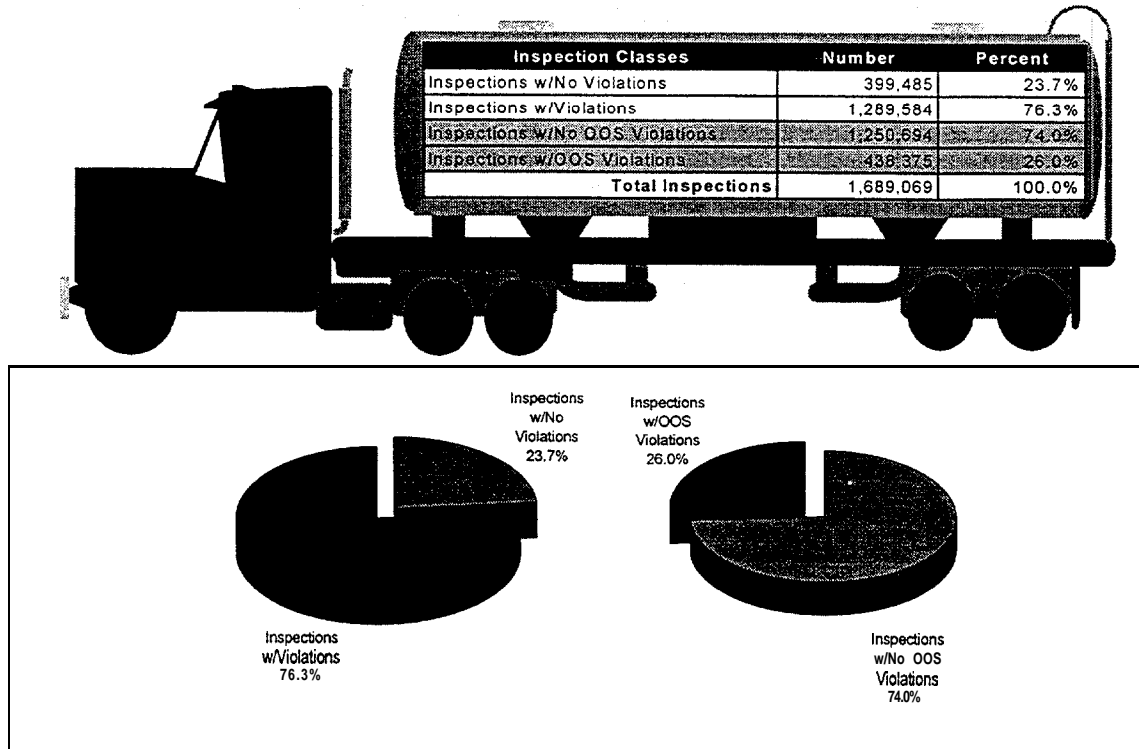
Inspection Totals

The 1,689,069 inspections of interstate vehicles and drivers conducted in 1996 may be divided into four classes:

- *Inspections/No Violations.* Includes inspections in which violations were not identified.
- *Inspections/Violations.* Includes inspections which resulted in the detection of one or more violations.
- *Inspections/No OOS Violations.* Includes inspections where violations designated as “out-of-service” were not identified.
- *Inspections/OOS Violations.* Includes inspections where one or more violations were designated as “out-of-service.”

Table 1-1 summarizes the 1996 data using these inspection classes. Figure 1-1 depicts, pictorially, the relationships among the classes. Three out of four inspections contained at least one violation, and one out of four inspections contained one or more out-of-service violations. Almost one out of three inspections with violations resulted in the driver or vehicle being placed out-of-service.

Table 1- 1. 1996 Inspection Totals

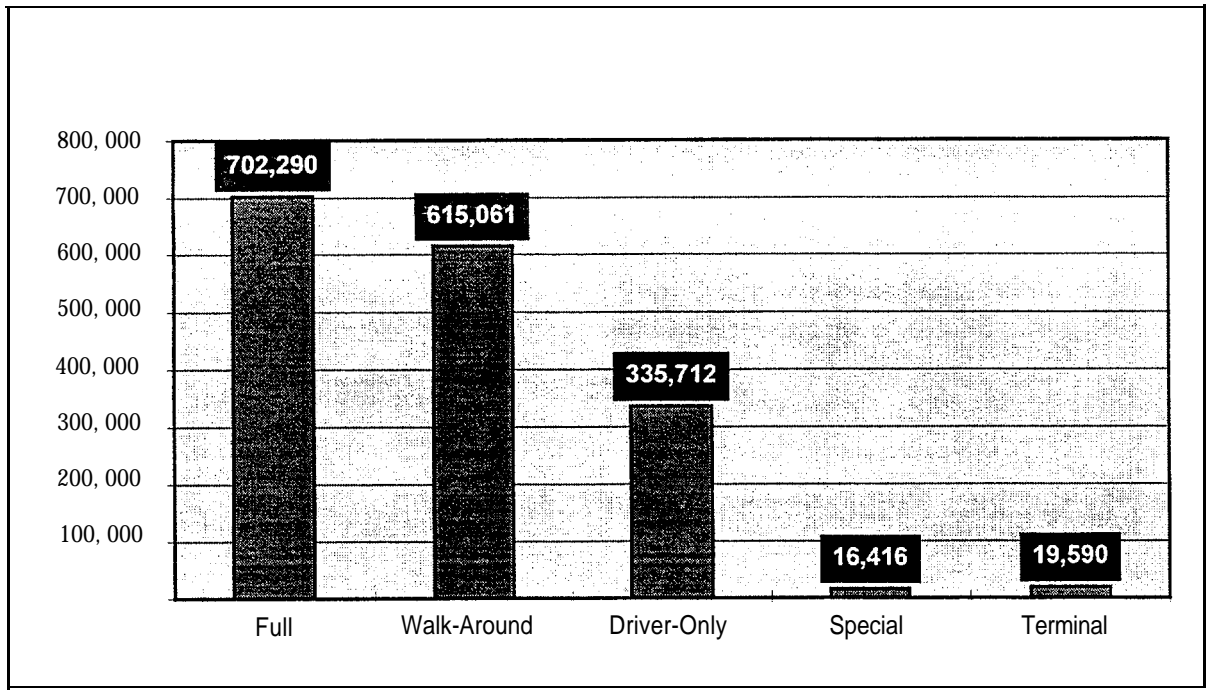


**Figure 1-1. 1996 Inspection Class Comparison
(N=1,689,069)**

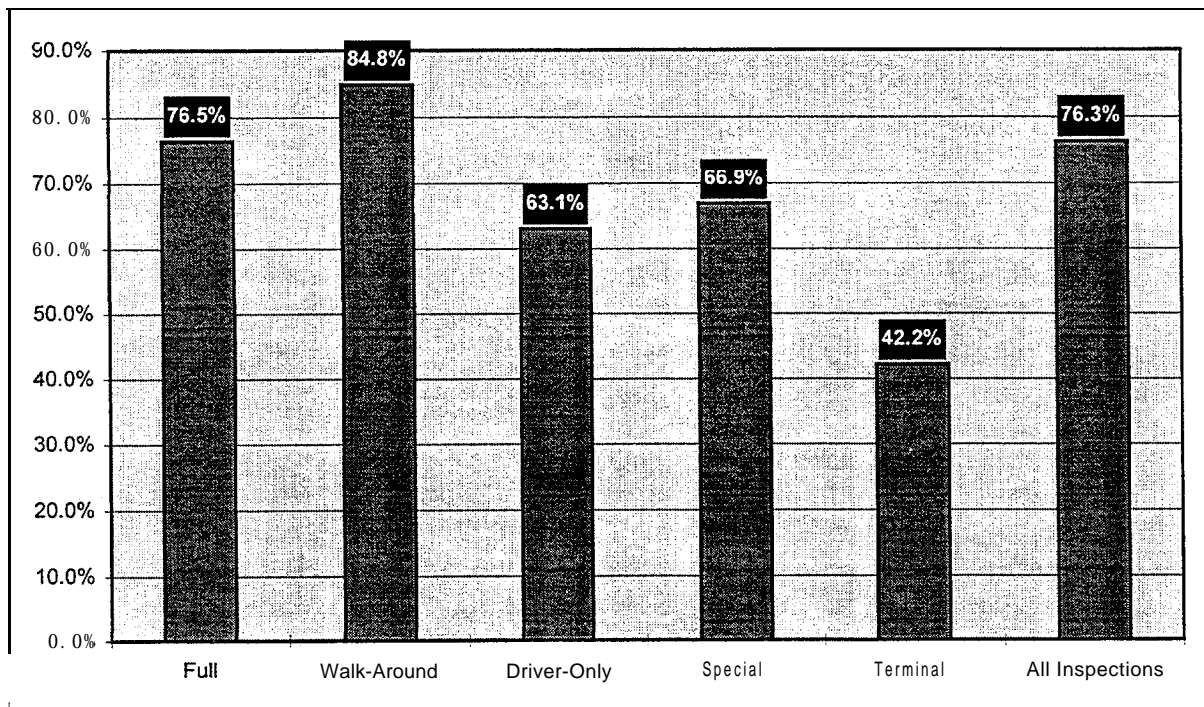
Figure 1-2 compares 1996 inspections, proportionally, by inspection level. The majority of inspection activities 42 percent-involved *Full Inspections*; 36 percent were *Walk-Around Inspections*, while 20 percent were *Driver-Only Inspections*. The remainder included *Terminal Inspections* conducted at carriers' places of business and miscellaneous *Special Studies*. Figures 1-3 and 1-4, which were derived from the numeric breakout of data in Table 1-2, offer the first evidence of a significant relationship between inspection level and inspection class. Although the percentage of inspections with violations for Full and Walk-Around Inspections was 76.5 percent and 84.8 percent respectively, the proportion with violations for Driver-Only Inspections was just 63.1 percent (Figure 1-3). In other words, while Full and Walk-Around Inspections were nearly equally

likely to result in the detection of at least one violation, Driver-Only Inspections tended to result in the detection of fewer violations.

Furthermore, when it came to the detection of out-of-service violations, there was a marked distinction even between Full and Walk-Around Inspections: 34.4 percent of Full Inspections resulted in the identification of one or more OOS violations, as compared to only 23.6 percent of Walk-Arounds (Figure 1-4). Just 13.3 percent of Driver-Only Inspections detected OOS violations. In general, movement up the continuum of inspection methodologies—from Driver-Only Inspections to Full Inspections—appeared to increase the likelihood that OOS violations would be detected. The relationship between inspection levels and inspection outcomes is a theme to which we will return throughout this report.



**Figure 1- 2. Inspections by Inspection Level
(N=1,689,069)**



**Figure 1- 3. Proportion of Inspections with Violations by Level
(N=1,689,069)**

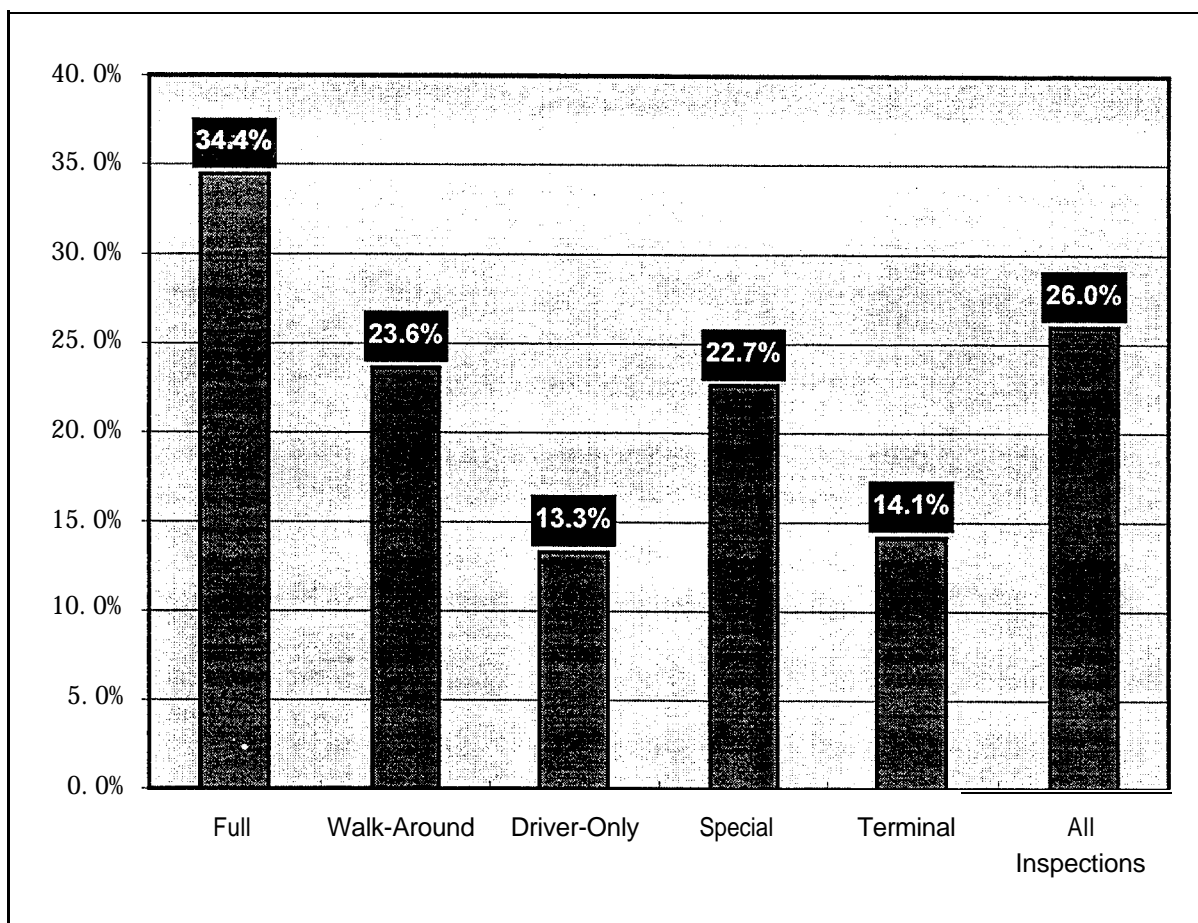


Figure 1-4. Proportion of Inspections with Out-of-Service Violations by Level

Table 1-2. Inspection Totals by Inspection Class and Inspection Level

Inspection Class	Inspection Level					All Inspections
	Full	Walk-Around	Driver-Only	Special	Terminal	
Inspections w/No Violations	165,258	93,513	123,958	5,433	11,323	399,485
Inspections w/Violations (Non-OOS)	295,192	376,211	167,045	7,264	5,497	851,209
Inspections w/Violations (OOS)	241,840	145,337	44,709	3,719	2,770	438,375
Inspections w/Violations (any)	537,032	521,548	211,754	10,983	8,267	1,289,584
Proportion of Insp. w/Violations	76.5%	84.8%	63.1%	66.9%	42.2%	76.3%
Total	702,290	615,061	335,712	16,416	19,590	1,689,069

As shown in Table 1-3, inspections with violations may be further divided into: *inspections with vehicle-only violations*, *inspections with driver-only violations*, and *inspections with both vehicle and driver violations*. Of the 1.3 million inspections with violations-non-OOS and OOS violations 7.9 percent involved vehicle-only violations, 26.2 percent contained both vehicle and driver violations, and 25.8 percent involved driver-only violations. Although sizable percentages of Full and Walk-Around Inspections resulted in vehicle-only violations, Full Inspections produced proportionally more vehicle-only violations than did Walk-Arounds (67.9 versus 45.8 percent); Walk-Arounds, on the other hand, spawned proportionally more driver-only violations than did Full Inspections (17.3 versus 5.4 percent). Similar patterns may be discerned among the 438,375 inspections containing OOS

violations (Table 1-4): Full Inspections produced proportionally more vehicle-only OOS violations than did Walk-Arounds (83.5 versus 64.0 percent); again, Walk-Arounds resulted in more driver-only OOS violations than did Full Inspections (28.5 versus 9.3 percent). Walk-Arounds contained a slightly higher proportion of inspections with both vehicle and driver OOS violations than did Full Inspections (7.5 versus 7.2 percent).

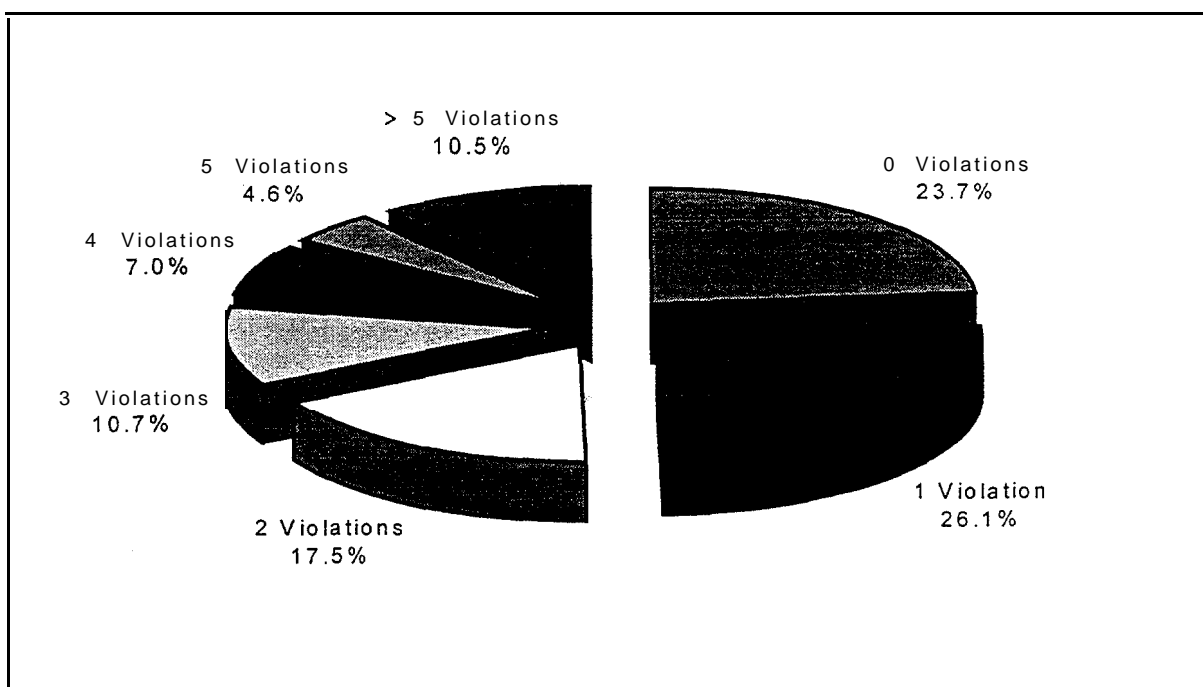
Figure 1-5 compares inspection outcomes by the number of violations identified. About one out of two 1996 inspections contained one to three violations per inspection; 15.1 percent contained five or more violations each. Figure 1-6 looks only at those inspections with out-of-service violations: 3.1 percent of the OOS inspections contained five or more OOS violations.

**Table 1- 3. Proportion of Inspections with Violations
by Violation Group and Inspection Level**

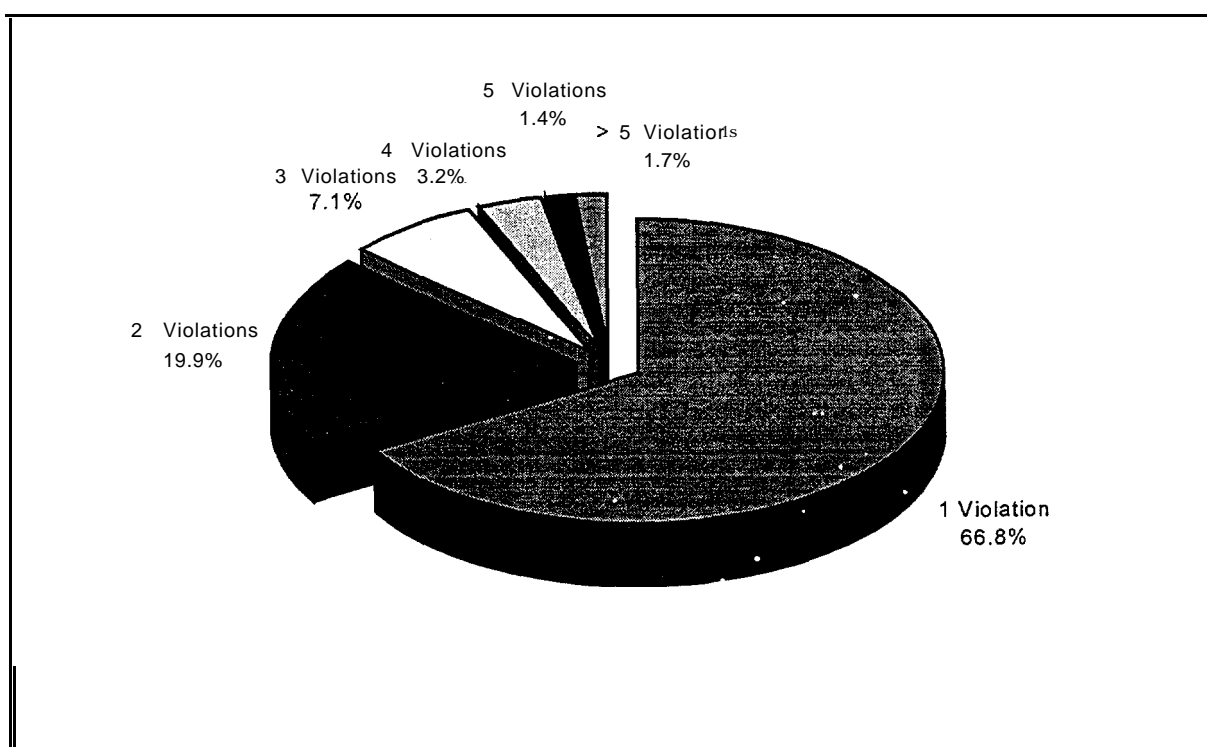
Violation Group	Full	Walk- Around	Driver- Only	Special	Terminal	All
Vehicle-Only Violations	67.9%	45.8%	0.0%	58.0%	100.0%	47.9%
Driver-Only Violations	5.4%	17.3%	100.0%	18.4%	0.0%	25.8%
Both Vehicle and Driver	26.7%	36.9%	0.0%	23.6%	0.0%	26.2%
Total Inspections with Violations	537,032	521,548	211,754	10,983	8,267	1,289,584

**Table 1- 4. Proportion of Inspections with Out-of-Service Violations
by Violation Group and Inspection Level**

Violation Group	Full	Walk- Around	Driver- Only	Special	Terminal	All
Vehicle-Only Violations	83.5%	64.0%	0.0%	78.3%	100.0%	68.6%
Driver-Only Violations	9.3%	28.5%	100.0%	14.7%	0.0%	24.9%
Both Vehicle and Driver	7.2%	7.5%	0.0%	7.0%	0.0%	6.5%
Total Inspections with OOS Viol	241,840	145,337	44,709	3,719	2,770	438,375



**Figure 1- 5. Total Inspections by Incidence of Violations
(N=1,689,069)**



**Figure 1- 6. Total Inspections with Out-of-S&vice Violations by Incidence
(N=438,375)**

Violation Counts

The 1.69 million driver-vehicle inspections of interstate carriers in 1996 involved over 4 million violations, including over 700,000 out-of-service violations (see Table 1-5). The average inspection resulted in 2.37 violations and 0.42 out-of-service violations.

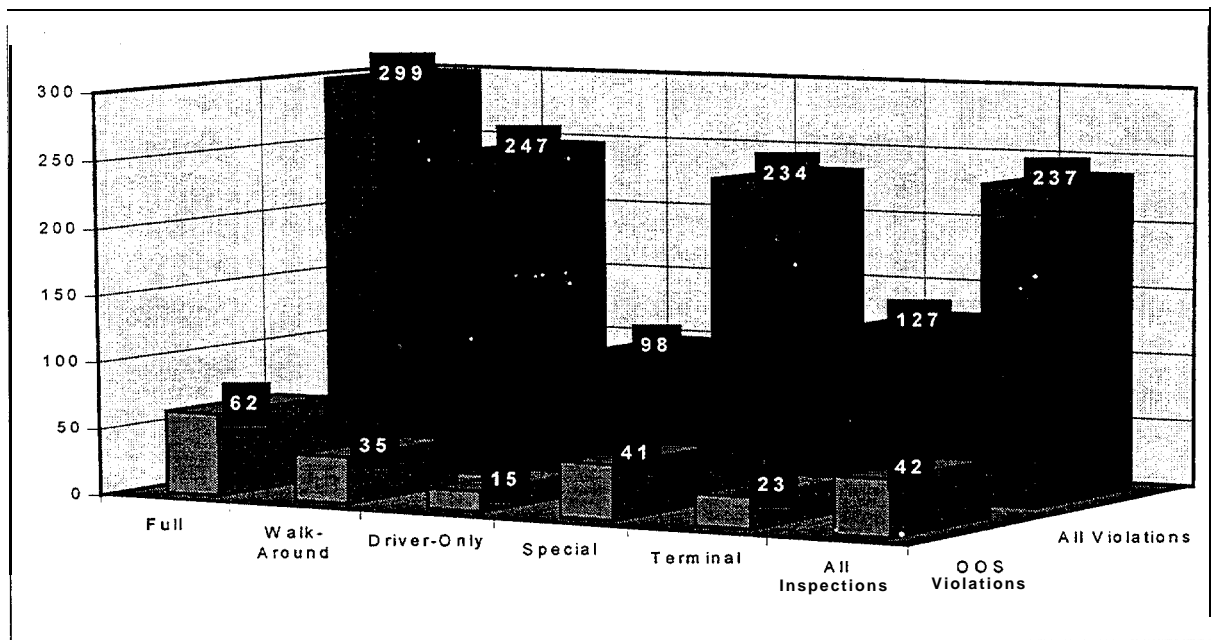
Figure 1-7 compares *violation rates*—measured as the mean number of violations per 100 inspections—for each inspection level. In general, the data reinforced what was observed in the preceding section: namely, that the more thorough the inspection methodology, the larger will be the volume of violations likely to be detected. For every 100 Full Inspections

conducted in 1996, 299 violations (including 62 OOS violations) were identified on average. This compares to 247 violations (including 35 OOS violations) for Walk-Arounds and 98 violations (including 15 OOS violations) for Driver-Only Inspections.

Looking at the data this way offers potentially valuable insights. For example, in the previous section (see Figure 1-3), it was observed that inspections were equally likely to result in the identification of at least one violation regardless of whether Full Inspections or Walk-Arounds were conducted. Here, however, the data may

Table 1-5. Violation and Out-of-Service Violation Counts by Inspection Level

	Full	Walk-Around	Driver-Only	Special	Terminal	All Inspections
Total Violations	2,099,798	1,518,252	329,649	38,371	24,955	4,011,025
Total OOS Violations	432,721	212,789	50,843	6,665	4,526	707,544
Total Inspections	702,290	615,061	335,712	16,416	19,590	1,689,069



**Figure 1- 7. Violation Rates per 100 Inspections by Inspection Level
(N=1,689,069)**

support the argument that Full Inspections, as opposed to Walk-Arounds, are likely to result in the discovery of a larger number of violations per inspection. This, of course, does not mean that Full Inspections are necessarily, always, the methodology of choice. For one thing, Full Inspections generally require more time to perform than do the other inspection levels. For another, the comparisons shown in Figure 1-7 are quantitative, not qualitative.

Without even examining the specific violations identified by the various inspection methodologies, one can still begin to make qualitative comparisons. One way to do this is to look at differences in the ratios of *total violations* to total out-of-service violations among the methodologies, based on the assumption that those vehicle and driver violations having the highest

potential to imperil public safety are designated "out-of-service." A ratio of 1: 1 would mean that every violation identified was OOS; a ratio of 10: 1 would mean that for every ten violations identified, one was OOS. The utility of this exercise is that it reveals differences in the abilities of the various inspection methodologies to identify critical OOS violations.

Figure 1-8 graphically depicts the ratios of total violations to OOS violations. The average for all levels of inspections is 5.67: 1, which means that for every 5.67 violations cited, one violation resulted in the vehicle or driver being placed out-of-service. In other words, Full Inspections (with a ratio of 4.85:1) were much more likely than Walk-Arounds (7.14: 1) and Driver-Only Inspections (6.48: 1) to produce OOS violations. Interestingly, Terminal Inspections also exhibited one of the lowest violations/OOS violations ratios at 5.51: 1.

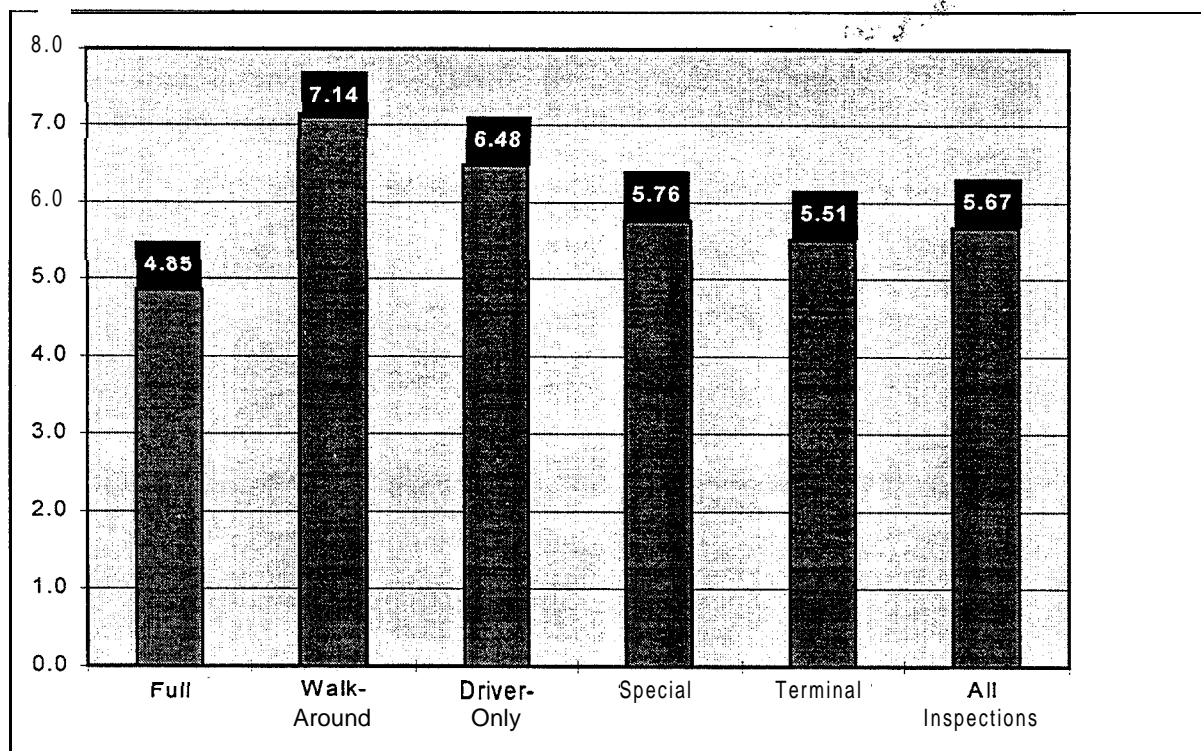


Figure 1- 8. Ratios of Total Violations to Out-of-Service Violations by Inspection Level (N=1,689,069)

Summary of Defects

Violations identified during the inspection process may be grouped according to whether the defect pertained to the vehicle, *driver*, or *hazardous materials*. Figure 1-9 below depicts the relationships among the three defect groups for 1996; the charts were prepared using the data shown in Table 1-6. (“Other” refers to violations containing insufficient information to be attributable to any of the defect groups.) 66.4 percent of all violations-and 73.0 percent of OOS violations-involved defects to the vehicle. Most of the remaining violations pertained to drivers. Figure 1-10 compares the ratio of total violations to OOS violations by defect

group: *more* than one out of every four hazardous materials violations resulted in an out-of-service citation; this contrasts with one out-of-service violation for every seven driver violations. Indeed, this is consistent with general perceptions that violations involving hazardous materials frequently imperil the public safety and are, therefore, more likely to result in OOS citations.

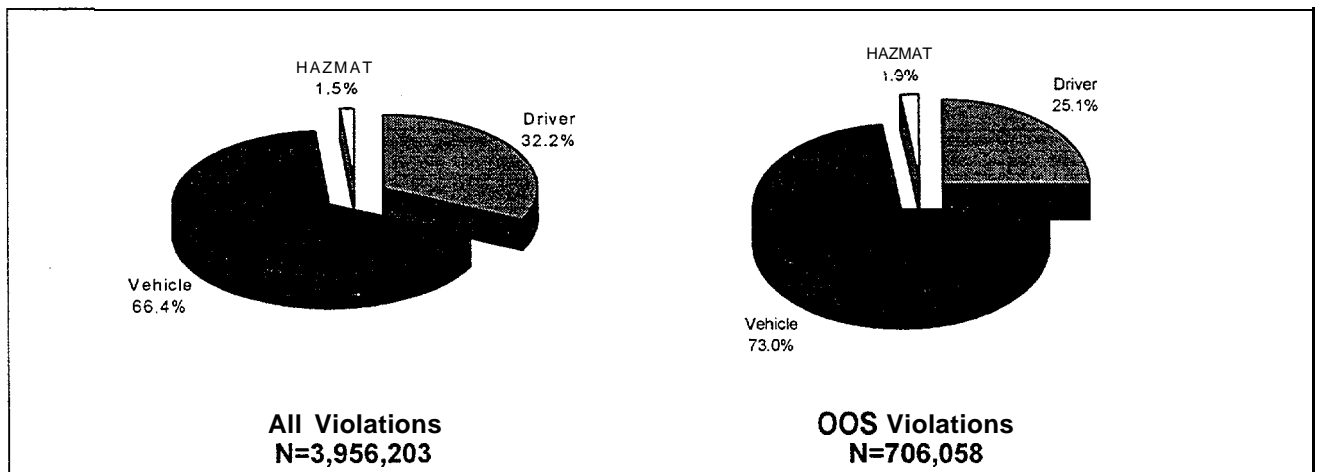


Figure 1- 9. Violation Summary by Defect Group

Table 1-6. Violation and Out-of-Service
Violation Counts by Defect Group

Defect Group	All Violations	OOS Violations	Percentage (All Violations)
Driver	1,272,357	177,399	32.16%
Vehicle	2,625,742	515,371	66.37%
HAZMAT	58,1041	13,2881	1.47%
Identified Total	3,956,203	706,058	100.00%
Other	54,822	1,486	1.37%
Total	4,011,025	707,544	100.00%

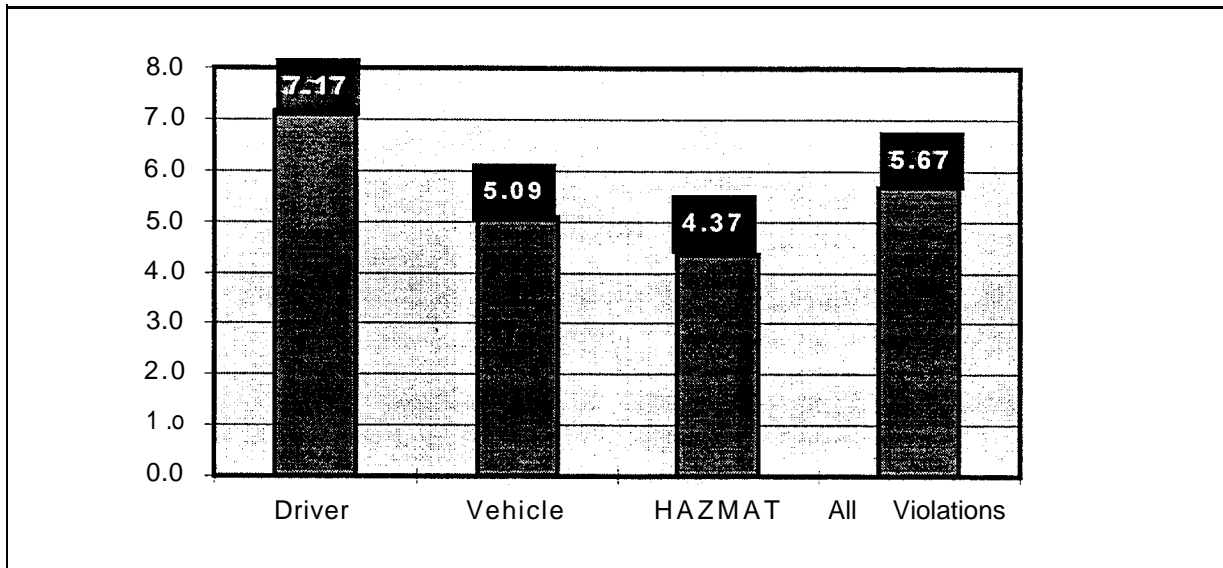
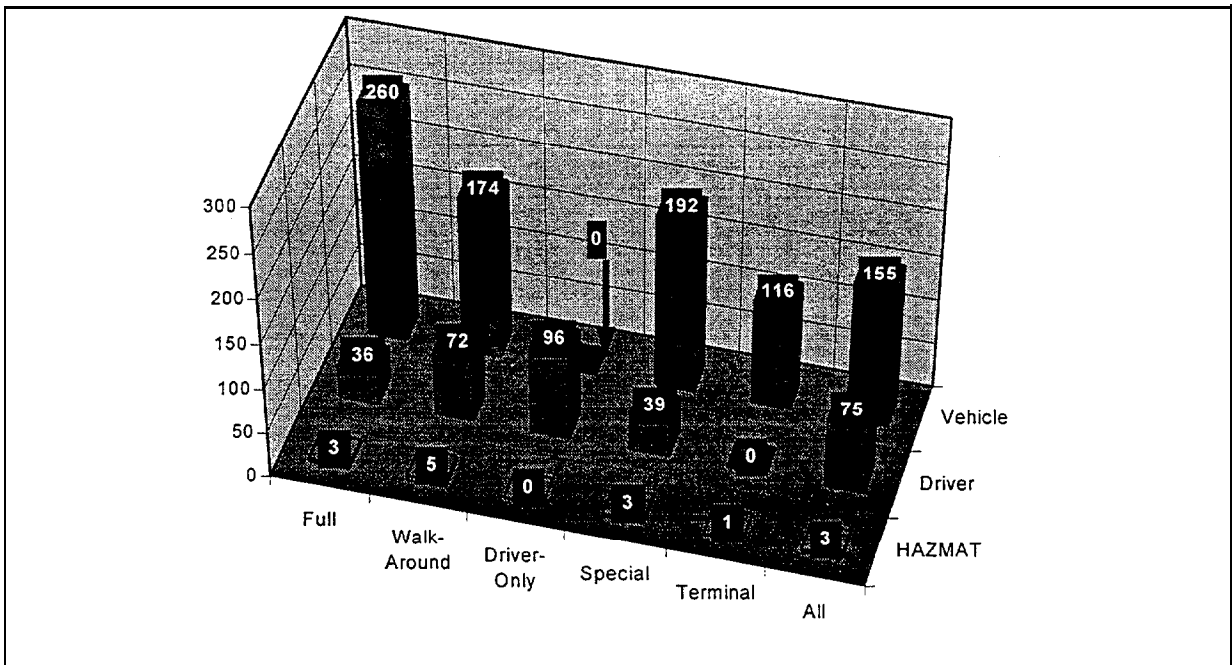


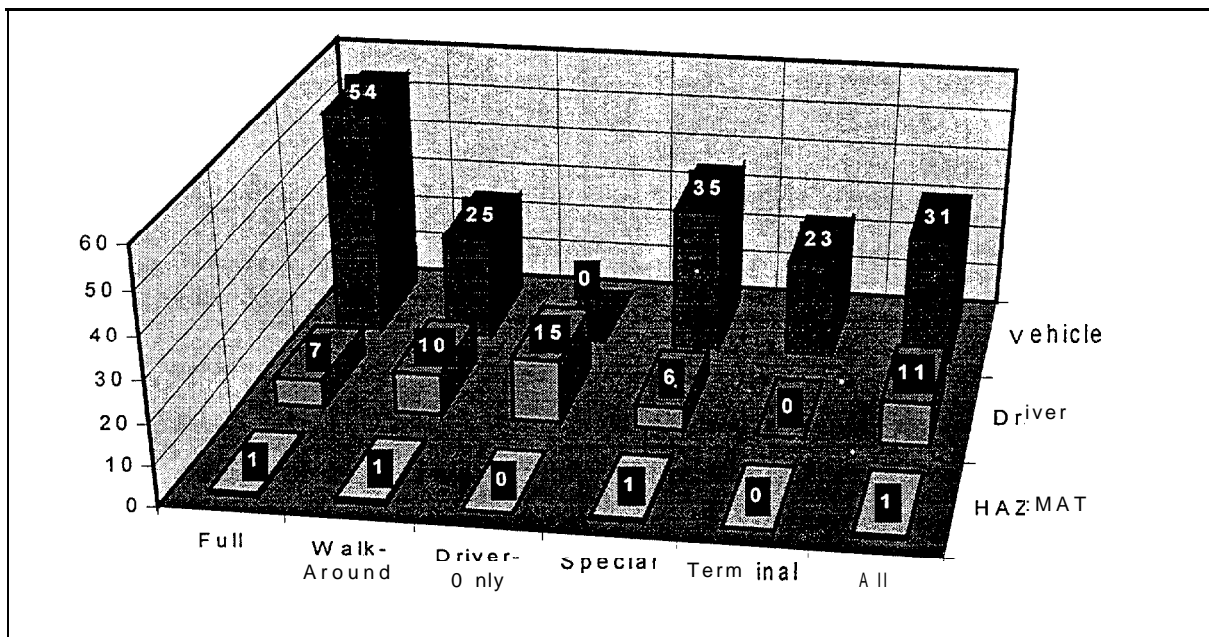
Figure 1- 10. Ratios of Total Violations to Out-of-Service Violations by Defect Group

Figure 1-11 compares violation rates by inspection level for vehicle, driver, and hazardous materials defects. Averages of 155 vehicle violations and 75 driver violations per 100 inspections were detected across all inspection levels. However, violation rates for individual inspection levels deviated significantly from the averages. For example, when Full Inspections were conducted, the proportion of vehicle violations increased beyond the average (to 260 per 100 inspections), but the proportion of driver violations decreased (to 36 per 100 inspections). In general, Full Inspections detected the largest number of vehicle violations, while Driver-Only Inspections identified the greatest number of driver violations (96 per 100 inspections). Walk-Arounds detected more driver violations (72 per 100 inspections) than Full Inspections (36 per 100 inspections) and many more vehicle violations (174 per 100 inspections) than Driver-Only Inspections (0 per 100 inspections).

Similar patterns may be observed when OOS violation rates by inspection level are compared (Figure 1-12). Interestingly, vehicle violations detected during Full Inspections were much more likely to result in OOS citations (54 out of 260 violations per 100 inspections, i.e., one out of five violations) than were those observed during Walk-Arounds (25 out of 174 violations per 100 inspections, i.e., one out of seven violations), perhaps because the majority of brake violations were detected during Full Inspections. This differential across the two inspection levels was reversed when driver violation rates were compared.



**Figure 1- 11. Violation Rates per 100 Inspections
by Defect Group and Violation Category
(N=1,689,069)**



**Figure 1- 12. Out-of-Service Violation Rates per 100 Inspections
by Defect Group and Violation Category
(N=1,689,069)**

Examination of violation rates for hazardous materials was limited, of course, only to those inspections where the vehicles were transporting hazardous materials at the time of the inspection. Figure 1-13 shows that 6.9 percent of all inspections involved hazardous materials.

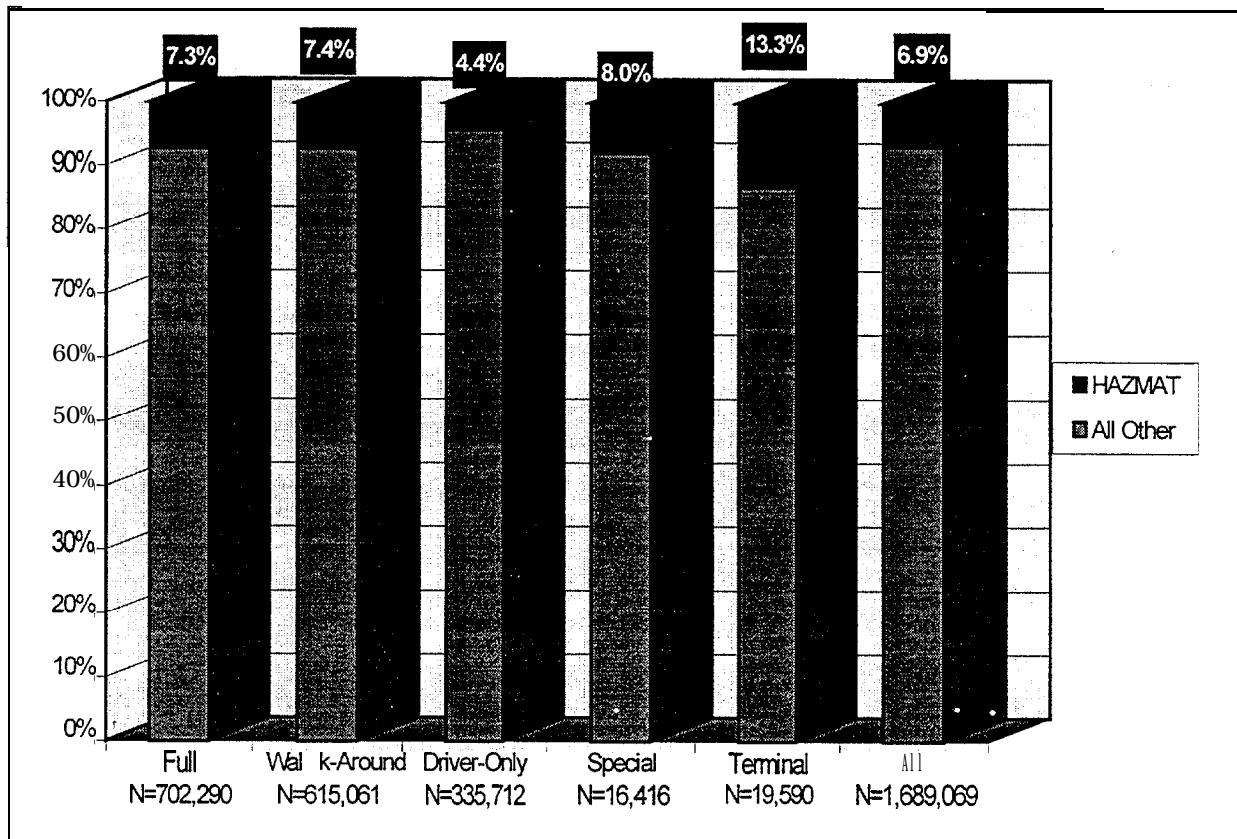


Figure 1- 13. Proportion of Inspections Involving Hazardous Materials

Figure 1-14 compares hazardous materials violation rates by inspection level. In general, the violation rate for hazardous materials was lower than the rate for vehicle and driver violations: there were 50 hazardous materials violations per 100 “HAZMAT” inspections versus 155 and 75, respectively, for vehicle and driver violations (see Figure 1-11). That pattern, however, did not hold up when hazardous materials OOS violations were compared to driver OOS violations—there were 11

hazardous materials OOS violations per 100 “HAZMAT” inspections versus 11 driver OOS violations (see Figure 1-12).

Finally, according to the 1996 data, Walk-Arounds were more likely to detect hazardous materials violations (55 violations per 100 “HAZMAT” inspections) than were Full Inspections (41 violations per 100 inspections); Full Inspections detected an average of 10 OOS violations per 100 HAZMAT inspections.

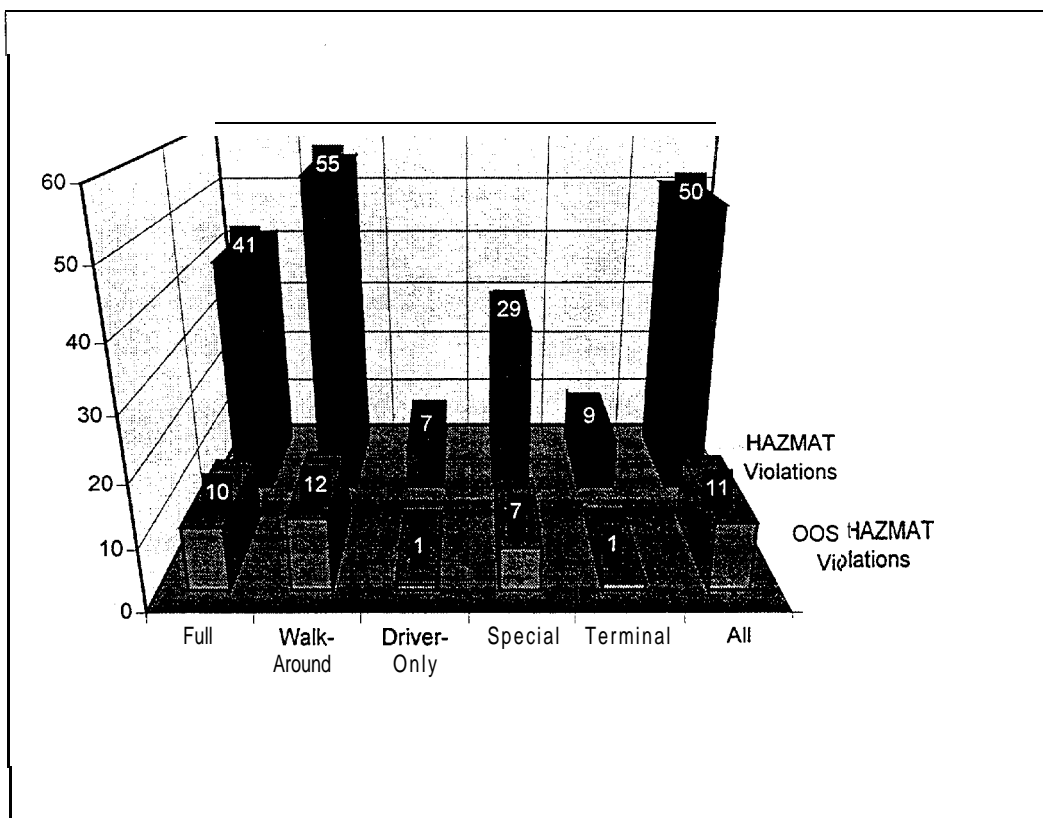


Figure 1- 14. HAZMAT Violation Rates/Out-of-Service Violation Rates per 100 HAZMAT Inspections by Inspection Level (N=116,041)

Table 1-7 shows counts for specific violations which occur under the three defect groups: vehicle, driver, and hazardous materials. (“Other” refers to violations containing insufficient information to be attributable to any of the defect groups.) Figures 1-15 through 1-17 compare violation and OOS violation rates within each of the defect groups. Again, the hazardous materials violation rates (Figure 1-17) were calculated only for those inspections involving hazardous materials.

Table 1- 7. Violation and Out-of-Service Violation Counts by Specific Defect

	Number of Violations	Percent of Violations	Number of OOS Violations	Percent of OOS Violations
Driver Violations				
Medical Certificate	106,993	2.7%	3,969	0.6%
False Log Book	24,385	0.6%	15,351	2.2%
No Log/Log Not Current	349,641	8.7%	67,339	9.5%
10/15 Hours	43,203	1.1%	25,689	3.6%
15/20 Hours	651	0.0%	42	0.0%
60/70/80 Hours	11,660	0.3%	11,660	1.6%
All Other Hours of Service	7	0.0%	0	0.0%
Disqualified Drivers	7,307	0.2%	5,621	0.8%
Drugs	1,244	0.0%	1,016	0.1%
Alcohol	2,629	0.1%	2,215	0.3%
Seat Belt	40,772	1.0%	83	0.0%
Traffic Enforcement	246,153	6.1%	4,198	0.6%
Radar Detectors	20,319	0.5%	1191	0.0%
All Other Driver Violations	417,197	10.4%	41,473	5.9%
Total Driver Violations ¹	1,272,357	31.7%	177,399	25.1%
Vehicle Violations				
Brakes, Out of Adjustment	286,777	7.1%	82,787	11.7%
Brakes, All Others	388,010	9.7%	114,200	16.1%
Coupling Devices	25,452	0.6%	9,112	1.3%
Fuel Systems	25,432	0.6%	11,232	1.6%
Frames	41,874	1.0%	7,511	1.1%
Lighting	677,813	16.9%	88,293	12.5%
Steering Mechanism	41,384	1.0%	12,556	1.8%
Suspension	97,962	2.4%	39,055	5.5%
Tires	230,797	5.8%	49,597	7.0%
Wheels, Studs, Clamps, etc.	57,708	1.4%	18,602	2.6%
Load Securement	28,973	0.7%	18,355	2.6%
Windshield	61,437	1.5%	509	0.1%
Exhaust Discharge	31,544	0.8%	2,583	0.4%
Emergency Equipment	142,345	3.5%	1,436	0.2%
Periodic Inspection	88,608	2.2%	193	0.0%
All Other Vehicle Defects	399,626	10.0%	59,350	6.4%
Total Vehicle Violations	2,625,742	65.5%	515,371	72.8%
HAZMAT Violations				
Shipping Paper	16,227	0.4%	3,822	0.5%
Improper Placarding	18,030	0.4%	4,583	0.6%
Accept. Ship Improperly Marked	1,518	0.0%	161	0.0%
Improper Blocking & Bracing	30	0.0%	14	0.0%
No Retest & Inspection (Cargo Tank)	2,608	0.1%	82	0.0%
No Remote Shutoff Control	621	0.0%	62	0.0%
Use of Non-specification Container	1,113	0.0%	253	0.0%
Emergency Response	3,776	0.1%	40	0.0%
All Other H/M Violations	14,181	0.4%	4,271	0.6%
Total HAZMAT Violations	58,104	1.4%	13,288	1.9%
OTHER	54,822	1.5%	1,486	0.2%
Total Violations	4,011,025	100.0%	707,544	100.0%

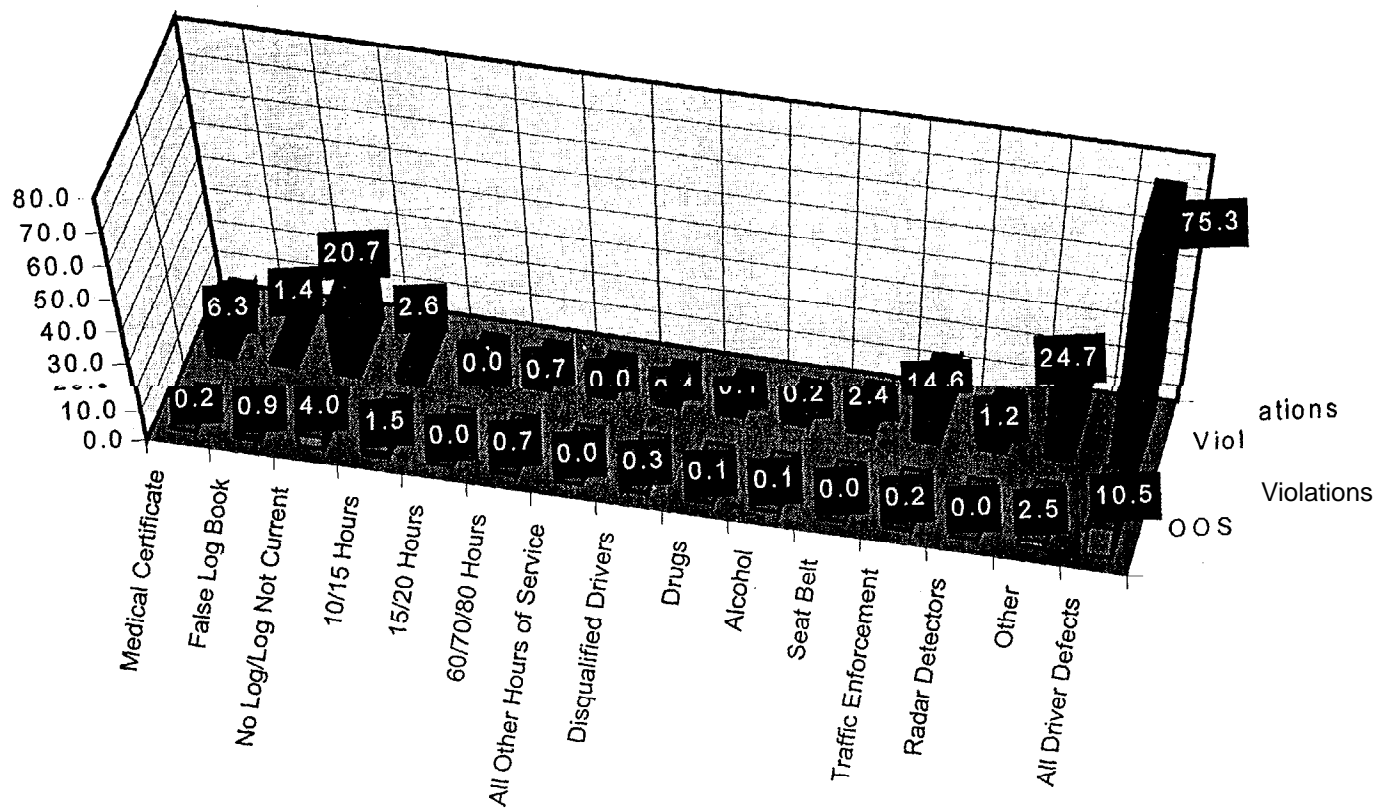


Figure 1- 15. Driver Violation and Out-of-Service Violation Rates
per 100 Inspections by Defect Type
(N= 1,689,069)

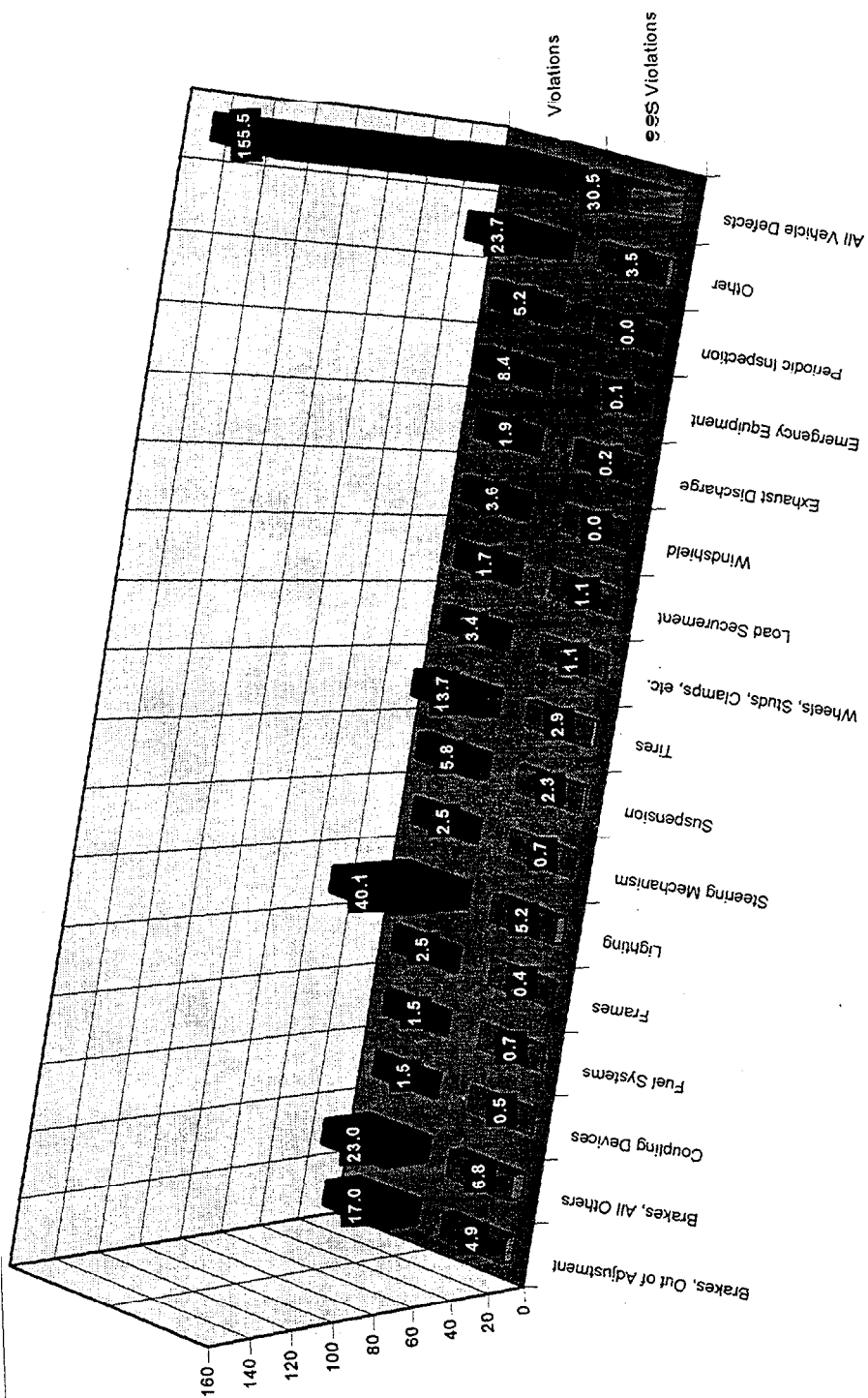
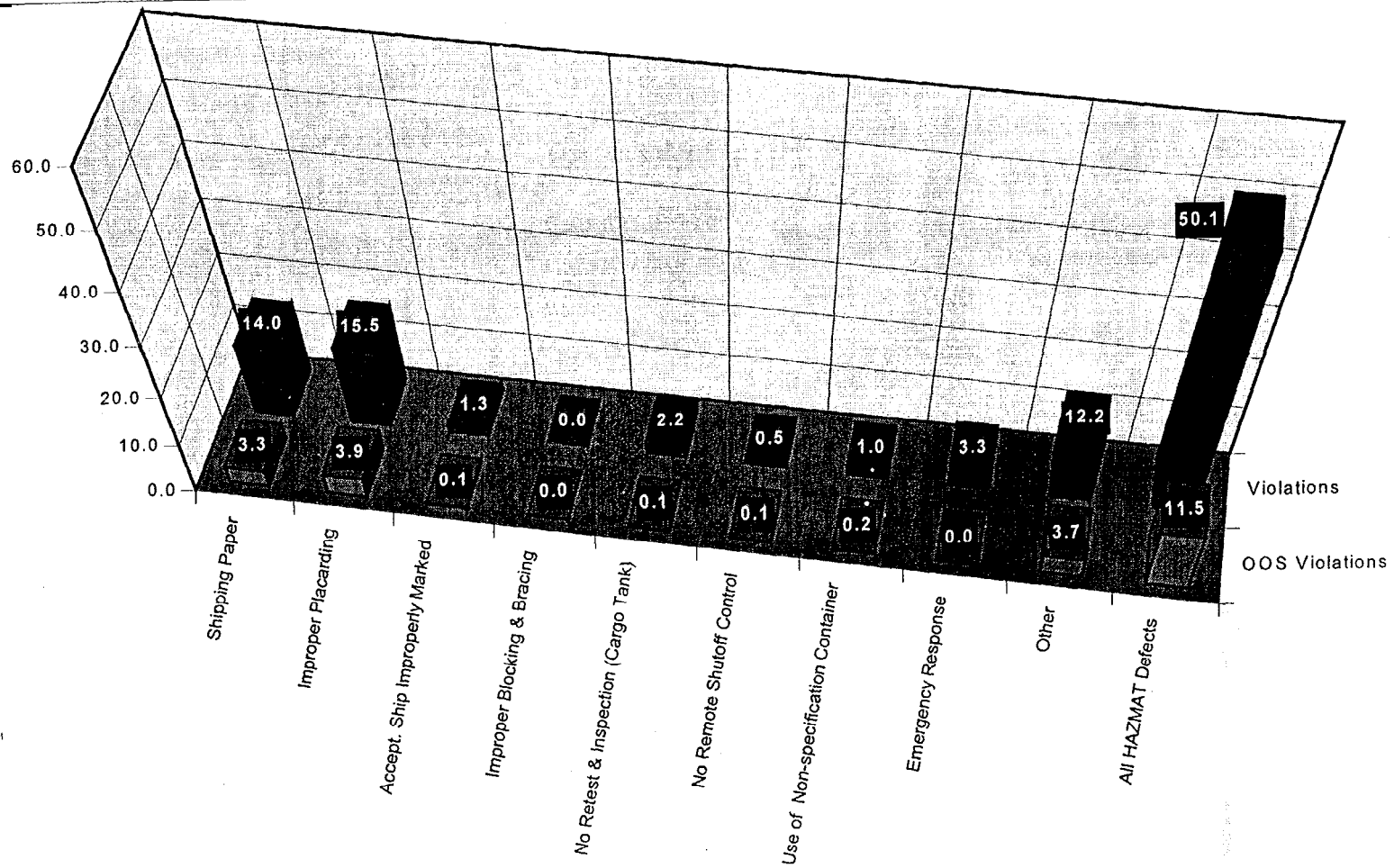


Figure 1-16. Vehicle Violation and Out-of-Service Violation Rates per 100 Inspections by Defect Type (N=1,689,069)



**Figure 1- 17. HAZMAT Violation and Out-of-Service Violation Rates
per 100 HAZMAT Inspections by Defect Type
(N=116,041)**

Figure 1-18 compares violation rates, by the most comprehensive inspection levels, for selected defects: (1) brakes, (2) lighting, (3) hours-of-service, (4) improper placarding, and (5) shipping paper. Brakes accounted for 16.8 percent of all inspection defects identified in 1996 (see Table 1-7), and nearly all of these defects were detected during Full Inspections. Walk-Arounds identified comparatively few brake violations, but consistently detected a higher incidence of non-brake violations than did Full Inspections.

Five-Year Trends

During the five-year period, 1992-1996, 7.3 million inspections of interstate carriers were conducted. Total annual inspections performed increased 29.6 percent, from over 1.30 million in Calendar Year 1992, to nearly 1.69 million in Calendar Year 1996

(Figure 1-19). Annual inspection activity increased at a slower pace during the period 1992-1994 than during 1994-1996. The number of inspections completed in 1996 increased by 10.6 percent over the 1995 totals.

Figures 1-20 and 1-21 compare the raw counts of violations and OOS violations by year. The trend lines show that the incidence of violations increased at a much slower pace than the frequency of inspections, and that the incidence of OOS violations actually declined. For the five-year period, 1992-1996, inspection activity increased by 29.6 percent, detection of violations increased by 20.8 percent, and detection of OOS violations declined by 10.2 percent despite an increase of 5.4 percent during 1995-1996.

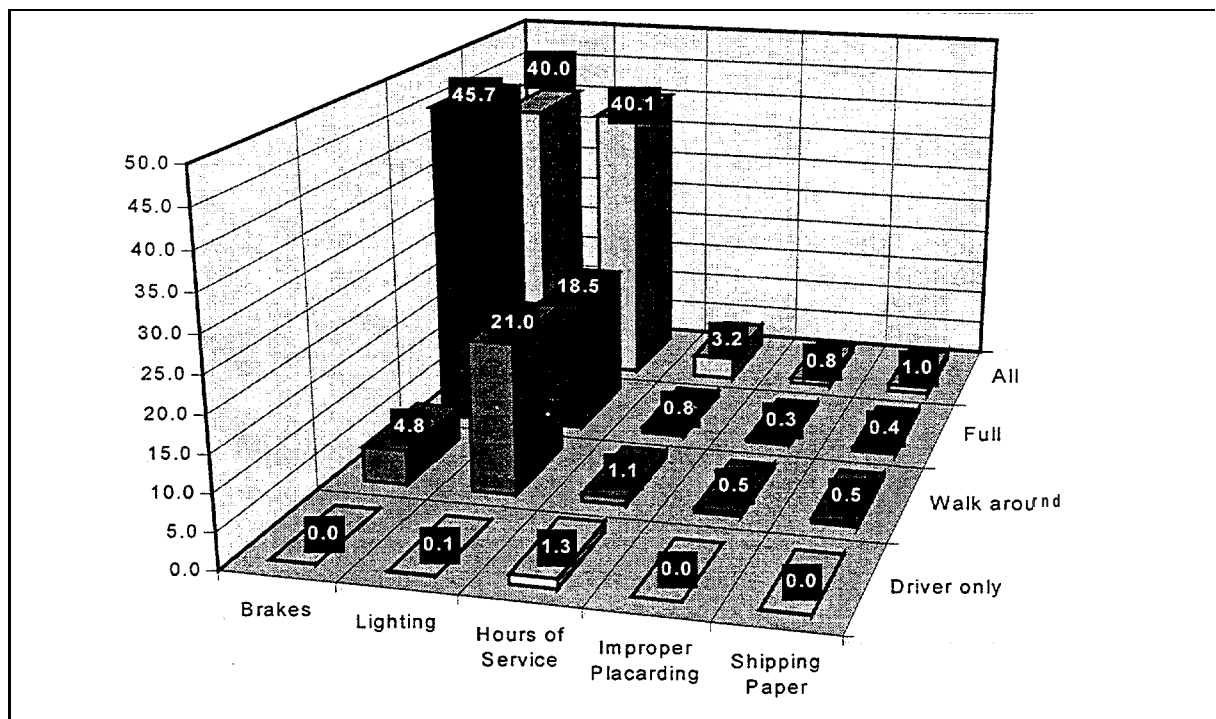


Figure 1- 18. Selected Defects by Inspection Level
Violation Rates per 100 Inspections
(N=1,689,069)

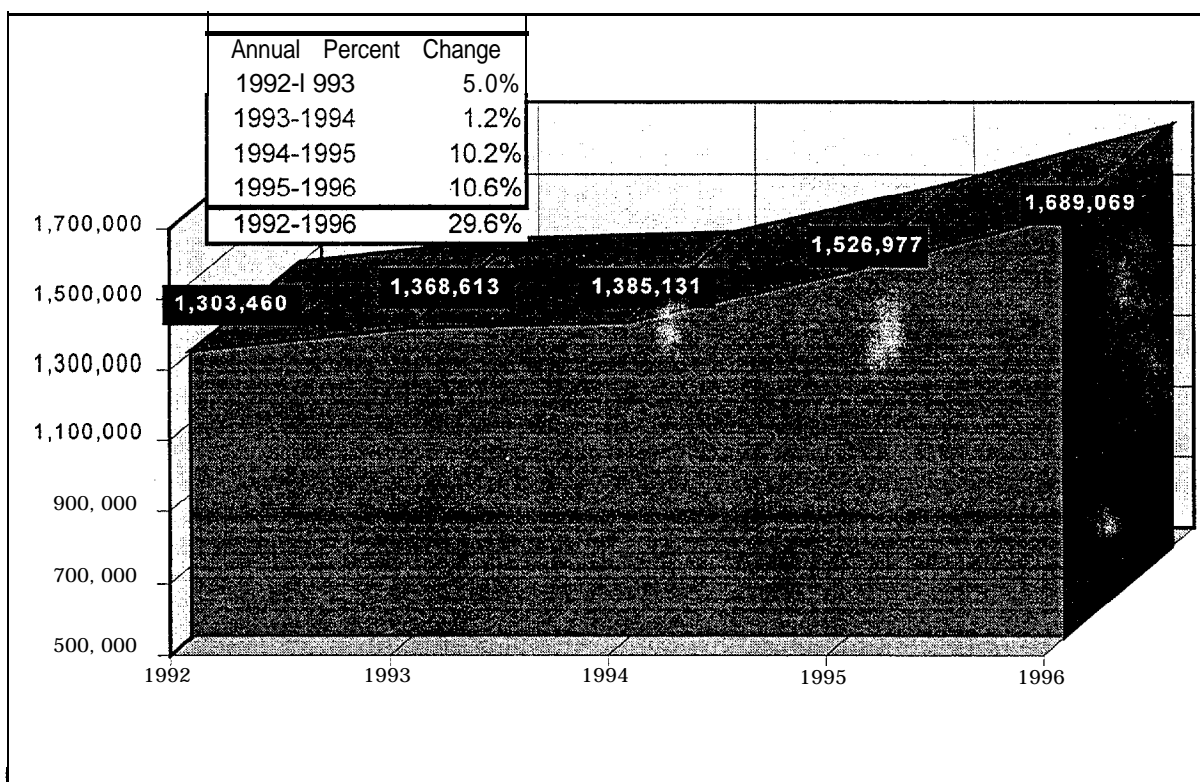


Figure 1- 19. Total Inspections by Year: 1992-1996

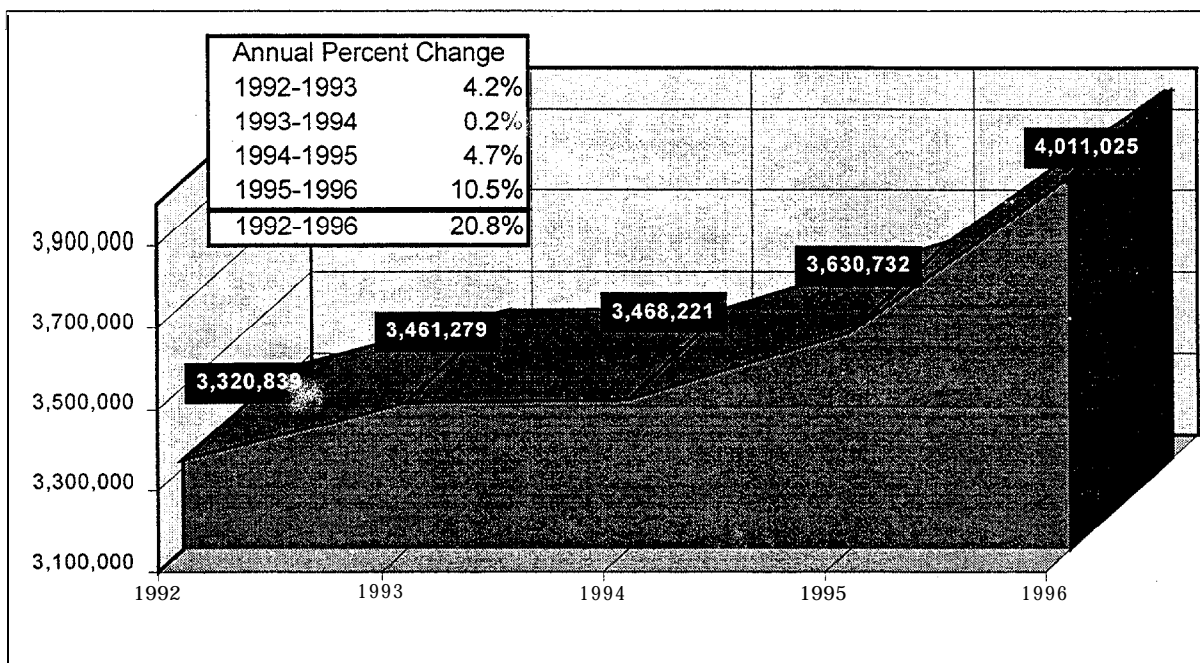


Figure 1- 20. Violation Counts by Year: 1992-1996

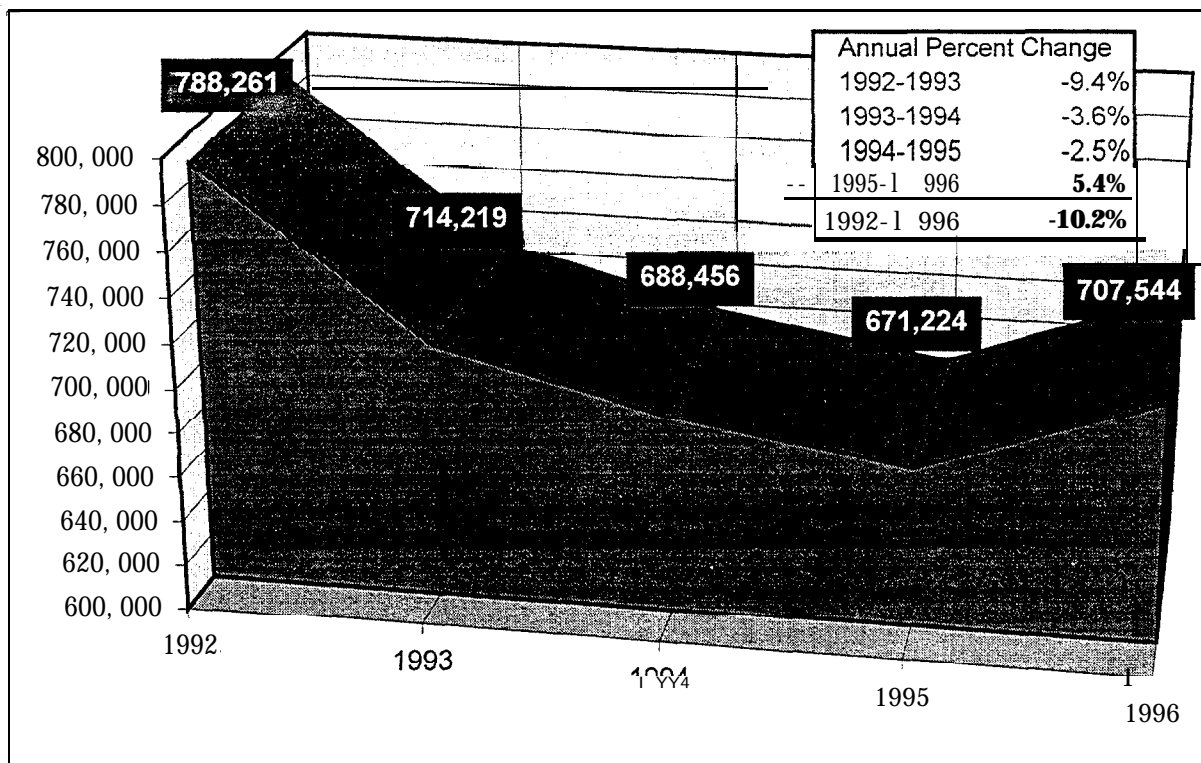


Figure 1- 21. Out-of-Service Violation Counts by Year: 1992-1996

The general trend becomes more apparent when the violation and OOS violation rates are compared for the five-year period (Figure 1-22). Both the violation and OOS violation rates had already peaked in 1992, at 255 and 60, respectively, per 100 inspections. By 1996 the rates had declined to 237 violations and 42 OOS violations per 100 inspections. One possible explanation for this trend is that recent public and private initiatives to improve the safety fitness of commercial vehicles were having a positive impact on inspection outcomes. The data presented here, however, are not adequate to

definitively support-or refute-this conclusion.

Figure 1-23 examines the ratio of total violations to OOS violations. Here, the trend was in the direction of a decided improvement in the ratio: in 1992 one out of every 4.2 violations resulted in an out-of-service citation; by 1996 only one in 5.7 violations produced an out-of-service citation.

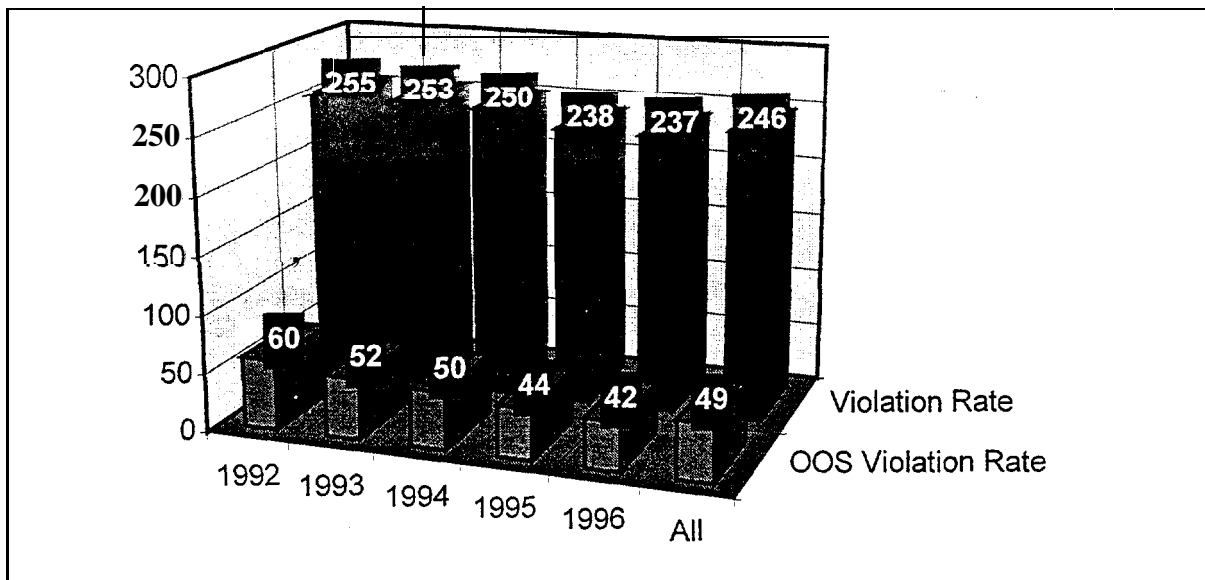


Figure 1- 22. Violation and OOS Violation Rate per 100 Inspections by Year: 1992-1996

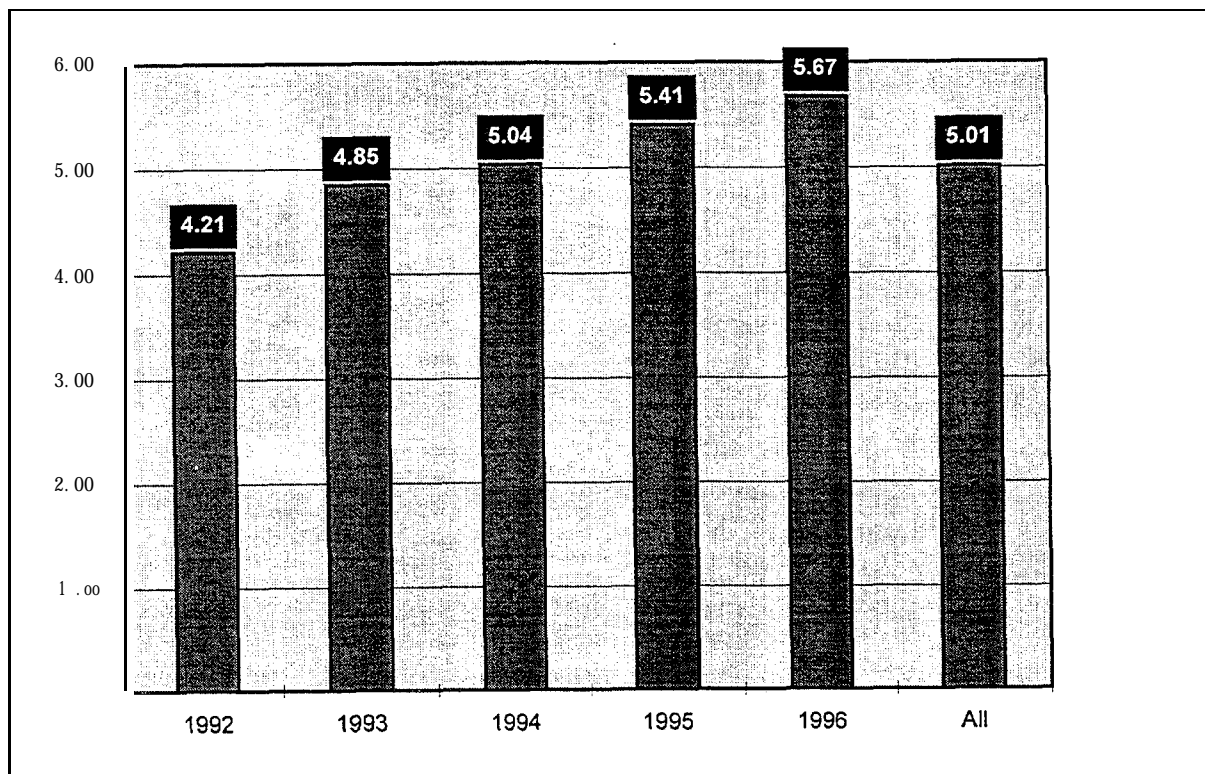


Figure 1- 23. Ratios of Total Violations to Out-of-Service Violations by Year: 1992-1996

CHAPTER 2

The Impact of Carrier and Vehicle Attributes

Carrier Summary
Carrier Type
Fleet Size
Vehicle Configuration
Hazardous Materials

Nearly nine out of ten inspections of interstate carriers performed in 1996 were attributable to "known" carriers. Of the known carriers, 87.1 percent were inspected 10 or less times each during the year, and 2.4 percent had over 50 inspections apiece; the average carrier was inspected 9.7 times during the year. Seven in ten inspections where carrier type was discernible involved for-hire carriers, and one out of two inspections where fleet size was known consisted of carriers operating 50 power units or less. In general, there was a strong inverse relationship between carrier fleet size and inspection outcomes—larger carriers had consistently lower violation rates than did smaller carriers. Four out of five inspections involved tractor-trailers, mostly singles. Vehicle violation rates for singles were slightly lower than those for doubles, while driver violation rates for singles were higher than those for doubles or triples. Buses, by far, had the lowest violation rate of any group. Whereas the violation rate for all vehicle types was 237 per 100 inspections, the rate for buses was 131. In one out of ten inspections, the vehicle was transporting hazardous materials at the time of inspection; the overall

violation rate for vehicles transporting hazardous materials was substantially lower than the rate for inspections where hazardous materials were not present.

Carrier Summary

Of all interstate inspections conducted in 1996, 87.0 percent were attributable to specific carriers; the OMCHS was not able to identify, positively, the carriers associated with 13.0 percent of the inspections (Table 2-1). Inspections in which carriers were clearly identified involved 15 1,960 distinct trucking entities, meaning that identified carriers were inspected an average of almost 10 times each over the course of the entire year (Table 2-2). During the year, each identified carrier was cited for an average of 22.0 violations and 3.8 OOS violations (Table 2-3). Figure 2-1 summarizes the breakout of violations per carrier among the three defect groups (vehicle, driver, and hazardous materials).

Table 2- 1. 1996 Inspections by Carrier Identification

	Number	Percent
Carriers Identified	1,470,077	87.0%
Carriers Not Identified	218,992	13.0%
Total Inspections	1,689,069	100.0%

Table 2- 2. Inspections by Known Carriers

	Number
Nut-herof inspections :	1,470,077
Number of Carriers	151,960
Average Inspections per Carrier	9.7

Table 2- 3. Violations by Known Carriers

	Number
NumberofViolations	3,346,660
Number of OOS Violations	584,238
Number of Carriers	151,960
Average Violations per Carrier	22.0
Average OOS Violations per Carrier	3.8

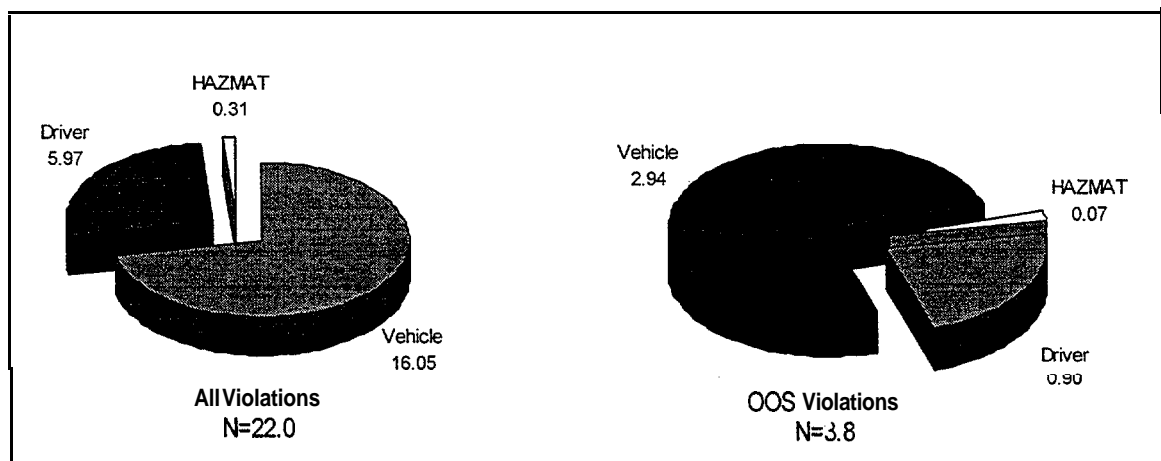


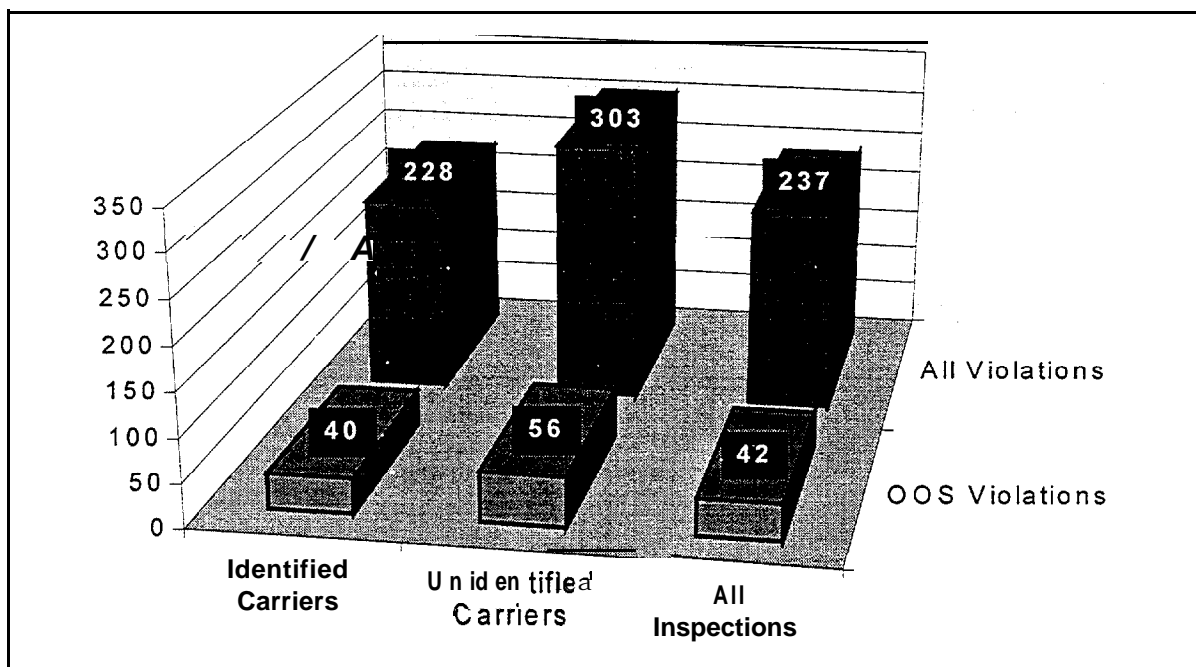
Figure 2- 1. 1996 Violation Breakout by Known Carriers

Table 2-4 shows a frequency distribution of inspection activity among the 151,960 companies identified by the OMCHS. Of the known carriers, 87.1 percent were inspected one to ten times in 1996. Less than 3 percent of all carriers were inspected over 50 times, while 0.4 percent of the carriers were inspected over 200 times.

Table 2- 4. Inspection Activity Frequency

Number of Inspections	Frequency
0 to 10	87.1%
11 to 25	7.7%
26 to 50	2.8%
51 to 75	0.9%
76 to 100	0.5%
101 to 200	0.6%
201 to 500	0.3%
over 500	0.1%
Total	100.0%

Figure 2-2 compares two sets of inspection outcomes: (1) inspections where the OMCHS clearly identified the carriers involved, and (2) inspections where the carriers could not be identified. The violation rate for the group of “identified” carriers was significantly lower (228 per 100 inspections) than the rate for “unidentified” carriers (303 per 100 inspections). The OOS violation rate was also different: 40 per 100 inspections for “identified” carriers versus 56 for “unidentified” carriers. In other words, the population of obscure, hard-to-identify carriers experienced, on average, 33 percent more violations per 100 inspections than did the group of “identified” carriers.



**Figure 2- 2. Violation Rates per 100 Inspections
Identified vs. Unidentified Carriers
(N= 1,689,069)**

Carrier Type

Of the 1.47 million inspections in which carriers were identified, seven out of every ten (68.4 percent) involved for-hire carriers (Table 2-5). Most of the remaining inspections (18.9 percent) involved private carriers. A relatively small number of the carriers (0.4 percent) were designated by the OMCHS as “both for-hire and private,”

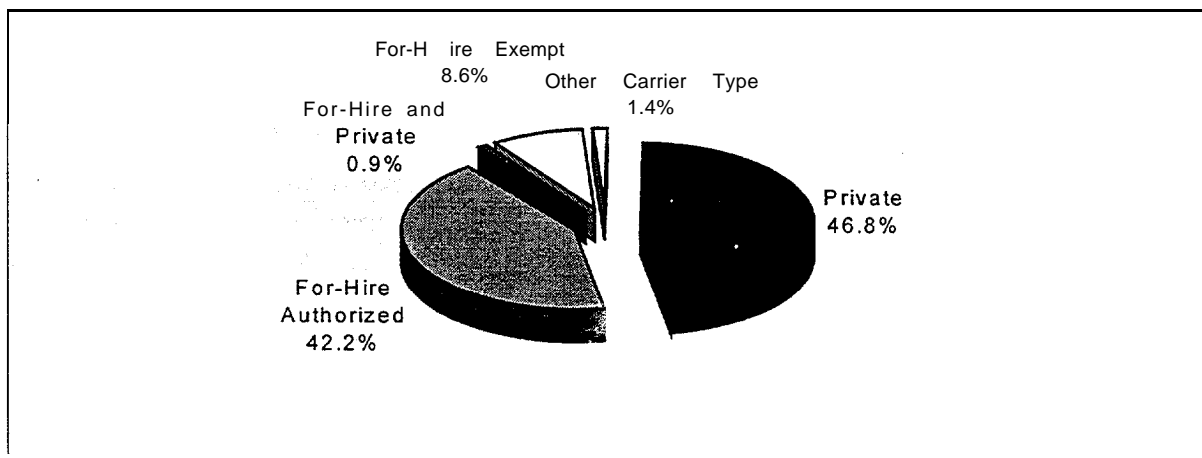
Figure 2-3 shows a breakout of the population of identified carriers inspected in 1996. Nearly half (46.8 percent) of all the inspected carriers were private and less than half (42.2 percent) were authorized for-hire.

Yet, as seen in Table 2-5, over three times as many inspections involved authorized for-hire carriers as private carriers. Hence, at first glance, it appears that authorized for-hire carriers had a much higher probability of being inspected than private carriers.

What initially appears as a higher probability, however, turns out not to be the case at all. Perhaps authorized for-hire carriers amassed the highest proportion of inspections not because of inherent biases in the safety inspection process, but, rather, because the authorized carriers were

**Table 2- 5. Inspections by Carrier Type
Known Carriers**

	Number	Percent
For-Hire Authorized	956,638	65.1%
For-Hire Exempt	49,428	3.4%
Private	277,924	18.9%
For-Hire & Private	5,305	0.4%
Other Carrier Type	180,782	12.3%
Total Inspections	1,470,077	100.0%



**Figure 2- 3. Distribution of 1996 Inspections by Carrier Type
(N= 151,960)**

“exposed” to the possibility of being inspected more often than any of the other carrier types. One way to test this hypothesis is to consider the extent to which authorized for-hire carriers were on the highway as measured by vehicle miles of travel (VMT) relative to other carrier types.

Table 2-6 reveals that the authorized for-hire carriers inspected in 1996 had an average fleet size of 20.24 vehicles per carrier, average VMT of 52,032 miles per vehicle, and average total VMT of 1.05 million miles per carrier. This contrasts with private carriers which had an average fleet size of 11.12 vehicles per carrier, average total VMT of 21,148 miles per vehicle, and average total VMT of 0.24 million miles per carrier.

Data from Figure 2-3 and Table 2-6 were used in Table 2-7 to calculate *expected* 1996 inspection frequencies by carrier type. The expected frequencies were then compared to the *experienced* values (from Table 2-5). Based on these data, approximately 78.4 percent of all 1996 inspections were “expected” to involve authorized for-hire

carriers; 19.4 percent were “expected” to involve private carriers. In practice, 65.1 percent of the 1996 inspections involved authorized for-hire carriers, while 18.9 percent involved private carriers. In other words, contrary to initial observations, the data indicate that the distribution of carrier type among 1996 inspected carriers came relatively close to reflecting the distributions among the carrier population at large.

Table 2-8 summarizes 1996 violation counts and OOS violation counts by carrier type. Figures 2-4 through 2-7 then compare the violation and OOS violation rates by carrier type. The comparison of rates for hazardous material violations in Figure 2-7 is limited to those inspections where hazardous materials were present.

**Table 2- 6. Average Fleet Size, per Unit VMT, and VMT per Carrier
by Carrier Type
Known Carriers Inspected in 1996**

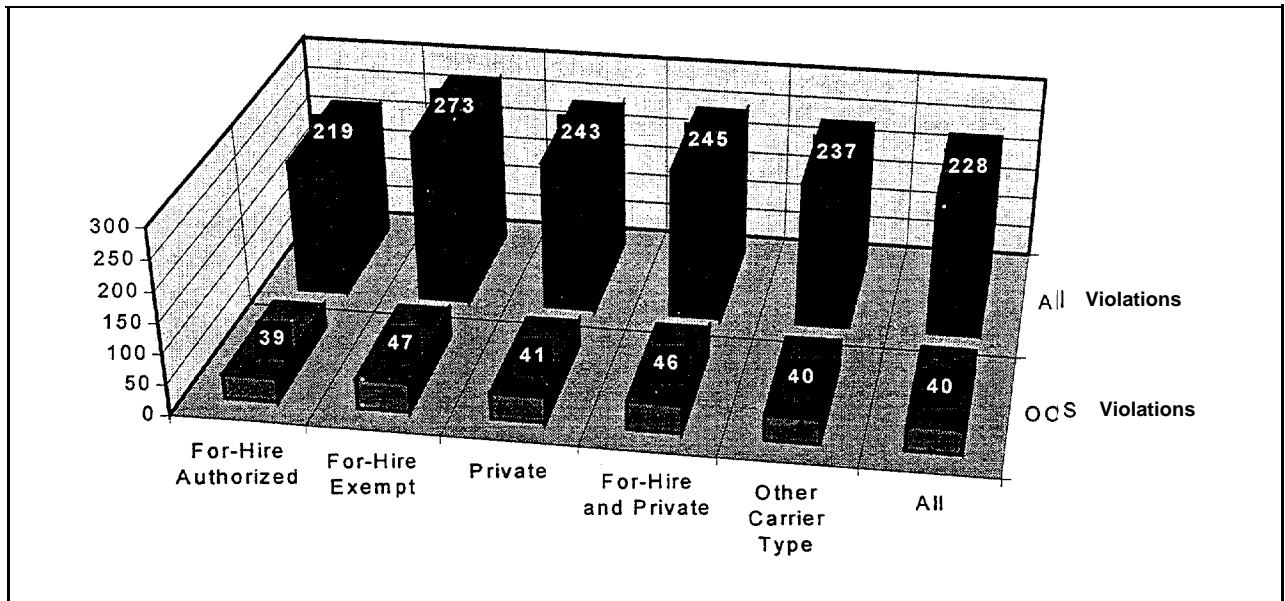
	For-Hire Authorized	For-Hire Exempt	Private	Both For Hire & Private	Other Carrier Type
Mean No. of Power Units in Fleet	20.24	10.20	11.12	5.99	4.91
Mean VMT per Power Unit	52,032	11,454	21,148	36,496	7,482
Mean VMT per Carrier Fleet	1,053,306	116,865	235,250	218,635	36,723

**Table 2- 7. Inspection Frequencies by Carrier Type
Expected vs. Experienced Values**

	For-Hire Authorized	For-Hire Exempt	Private	Both For-Hire & Private	Other Carrier Type	All
Carrier Representation in Population	42.2%	8.6%	46.8%	0.9%	1.4%	100.0%
Mean VMT per Carrier (000)	1,053	117	235	219	37	1,661
Proportional VMT (000)	445	10	110	2	1	568
Inspection Proportion -- Expected	78.4%	1.8%	19.4%	0.4%	0.1%	100.0%
Inspection Proportion -- Experienced	65.1%	3.4%	18.9%	0.4%	12.3%	100.0%

Table 2- 8. Violations and OOS Violations by Carrier Type

	All Violations		OOS Violations	
	Number	Percent	Number	Percent
For-Hire Authorized	2,093,659	62.6%	372,132	63.7%
For-Hire Exempt	135,022	4.0%	23,458	4.0%
Private	676,388	20.2%	114,458	19.6%
For-Hire & Private	12,991	0.4%	2,432	0.4%
Other Carrier Type	428,600	12.8%	71,758	12.3%
Total Violations	3,346,660	100.0%	584,238	100.0%



**Figure 2- 4. Violation and OOS Violation Rates
per 100 Inspections by Carrier Type
N=(1,479,077)**

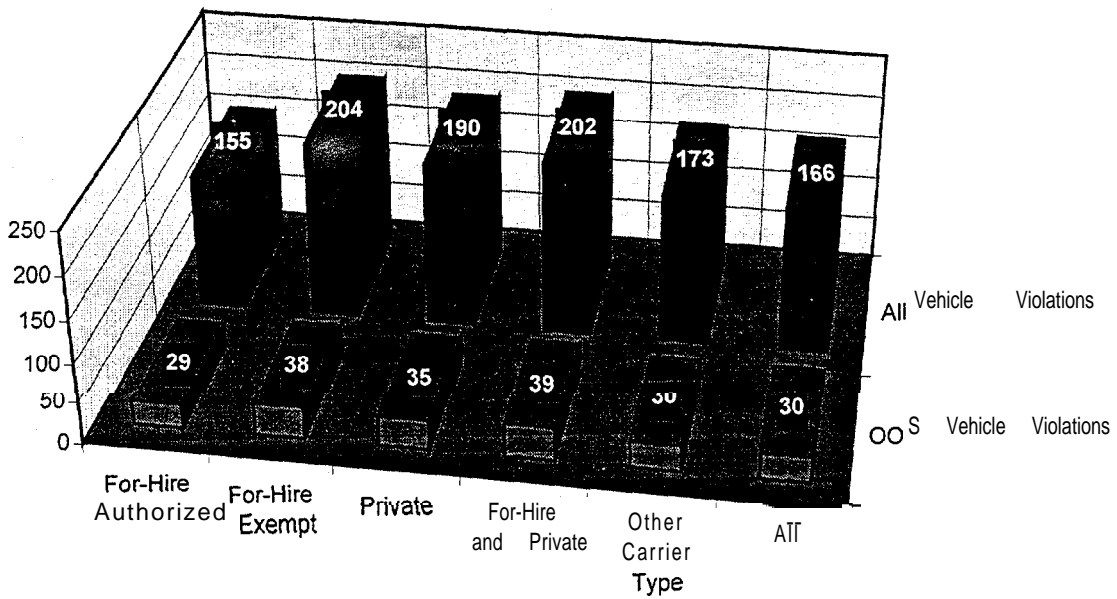


Figure 2- 5. Vehicle Violation and OOS Violation Rates per 100 Inspections by Carrier Type
N=(1,470,077)

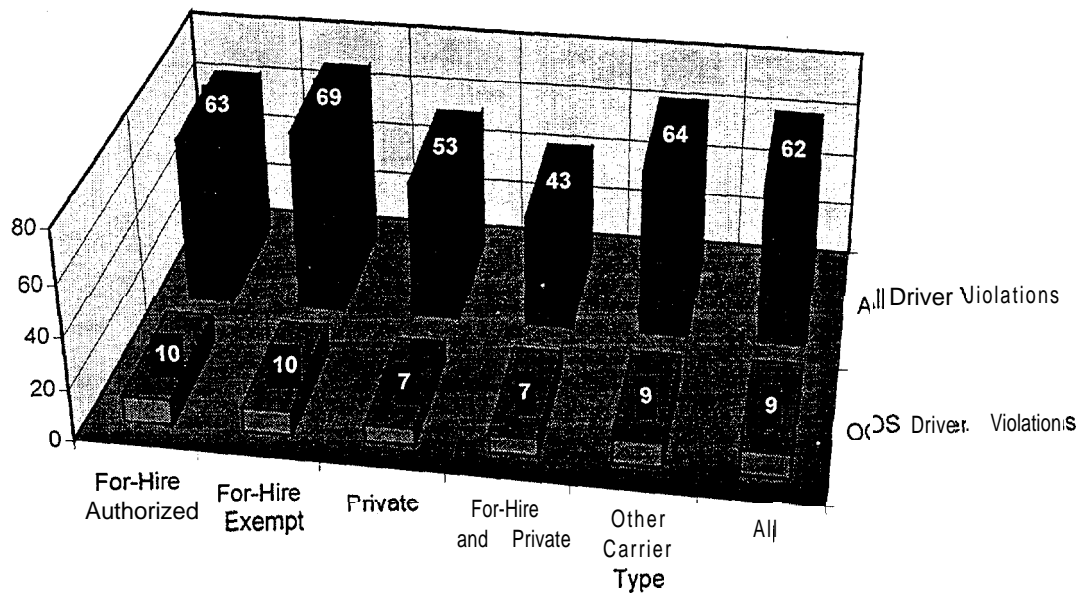


Figure 2- 6. Driver Violation and OOS Violation Rates per 100 Inspections by Carrier Type
N=(1,470,077)

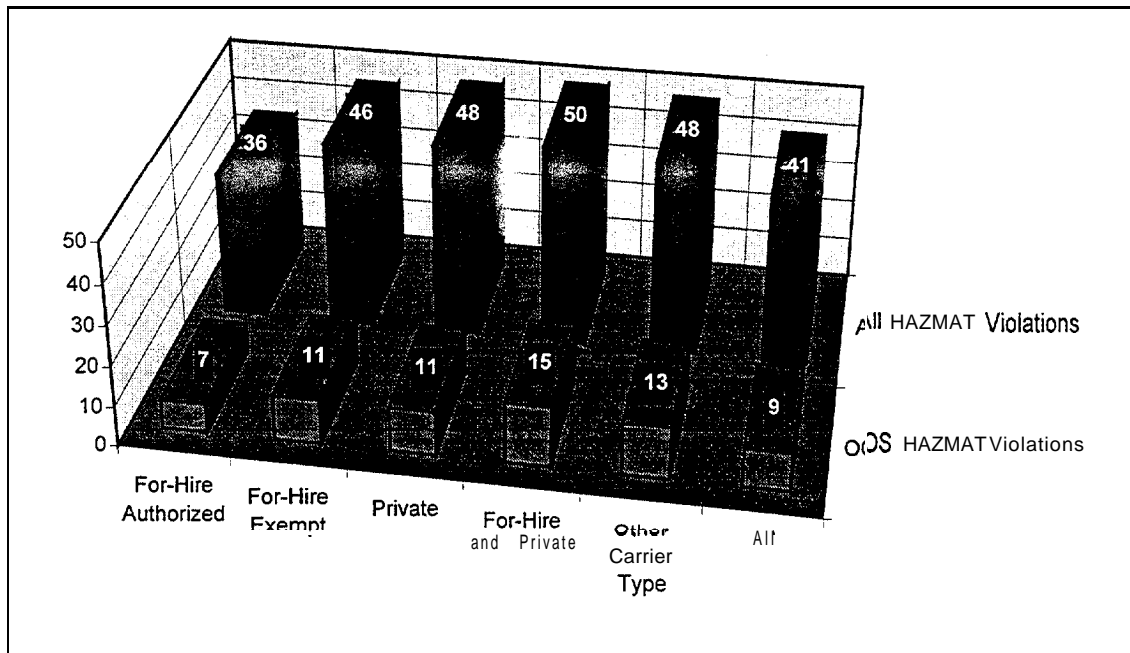


Figure 2- 7. HAZMAT Driver Violation and OOS Violation Rates per 100 HAZMAT Inspections by Carrier Type N=(116,041)

There appeared to be meaningful differences in the violation rates of the different carrier types. Initially, one might have conjectured that these differences were more a function of fleet size than carrier type. For example, exempt for-hire carriers (average fleet size: 10.20 power units) experienced 273 violations per 100 inspections versus 219 violations per 100 inspections for authorized for-hire carriers (average fleet size: 20.24 power units) (Figure 2-4). Private carriers (average fleet size: 11.12 power units) experienced more total violations-243 per 100 inspections-but close to the same number of OOS violations-41 versus 39 per 100 inspections-as authorized for-hire carriers. While the vehicle and hazardous materials violation rates (Figures 2-5 and 2-7, respectively) were higher for private carriers than for authorized for-hire carriers,

the driver violation' rate (Figure 2-6) was actually lower for private carriers-53 violations per 100 inspections versus 63 violations for authorized for-hire carriers.

Fleet Size

Carrier fleet size-measured as a count of total power units owned or operated-was discernible for more than 1.47 million 1996 inspections. As shown in Table 2-9, nearly one out of two (44.8 percent) of all inspections in which fleet size could be identified involved companies operating 50 power units or less. Over one fifth (21.2 percent) of the inspections entailed carrier operations of 51 to 400 power units. The remaining known inspections (16.2 percent) involved carriers operating over 400 power units each.

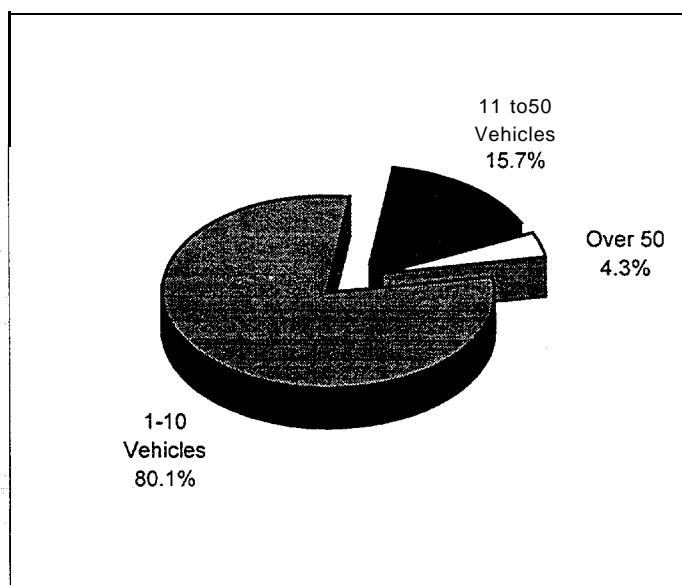
Table 2- 9. Inspections by Fleet Size

Fleet Size	Number	Percent
1-10 (A)	351,592	23.9%
11-50 (B)	307,589	20.9%
51-400 (C)	311,588	21.2%
401-2000 (D)	170,177	11.6%
2001-5000 (E)	26,090	1.8%
>5000 (F)	41,544	2.8%
Other	261,497	17.8%
Total	1,470,077	100.0%

Figure 2-8 offers a breakout of carriers inspected during the year where fleet size was known. The overwhelming majority of inspected carriers (80.1 percent) owned or operated 1-10 power units, while only 4.3 percent of the carriers operated 51 or more power units. Approximately 0.43 percent of the carriers operated more than 400 power units. Indeed, a precursory comparison of the information in Figure 2-8 and Table 2-9 brings to mind the types of patterns observed in the preceding section on carrier type: 80.1 percent of the carriers inspected

operated 1-10 vehicles, but only 23.9 percent of all inspections involved those carriers!

Table 2-10 examines each fleet size category in terms of vehicle miles of travel. It may be seen, for example, that the smallest carriers (1-10 power units) traveled an average of 94,000 miles per year, whereas the largest companies (over 5,000 power units) each averaged 305,789,000 miles per year. By taking account of the VMT, the expected fleet size frequencies could be calculated and compared to the actual (i.e., experienced) frequencies. ("Other" refers to inspections attributed to known carriers with insufficient fleet size information.)



**Figure 2- 8. Distribution of 1996 Inspected Carriers by Fleet Size
Known Carriers and Known Fleet Size
(N= 151,960)**

**Table 2- 10. Inspection Frequencies by Fleet Size
Expected vs. Experienced Values**

	Power Units							Total
	1 to 10	11 to 50	51 to 400	401 to 2,000	2,001 to 5,000	Over 5000	Other	
Carrier Representation in Population	80.06%	15.67%	3.84%	0.38%	0.04%	0.02%	17.31%	100.00%
Mean VMT per Carrier (000)	94	943	5,654	35,284	74,206	305,789	8	
Proportional VMT (000)	75	148	217	132	26	57	1	656
Inspection Proportion - Expected	11.4%	22.5%	33.1%	20.2%	4.0%	8.6%	0.2%	100.0%
Inspection Proportion - Experienced	23.9%	20.9%	21.2%	11.6%	1.8%	2.8%	17.8%	100.0%

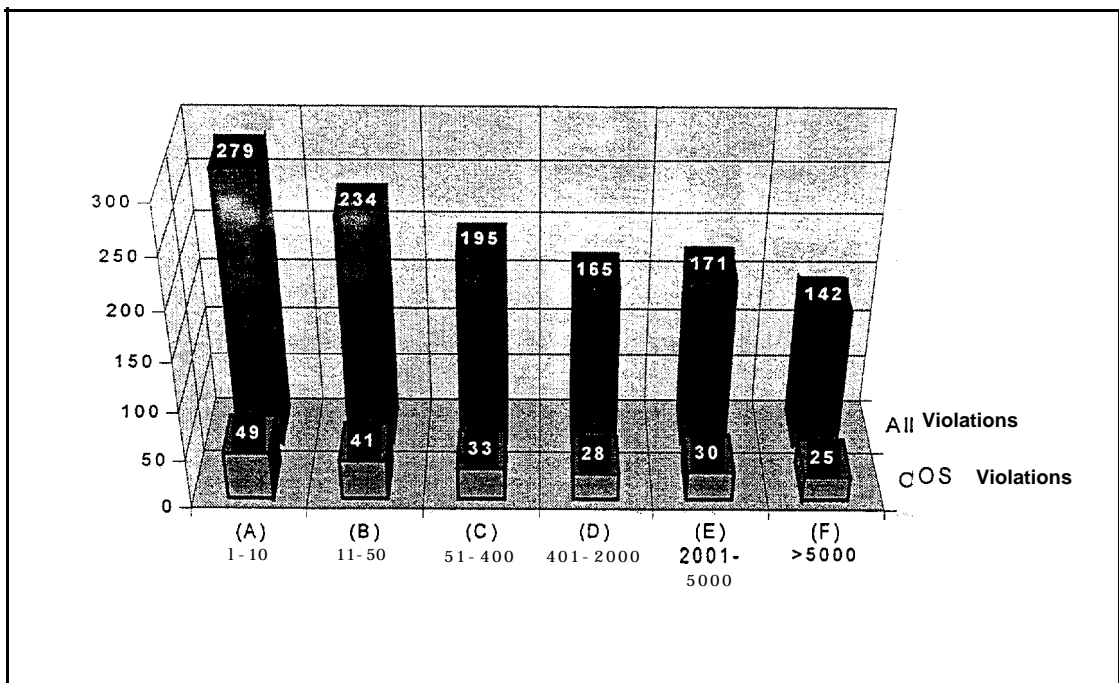
The analysis presented in Table 2-10 suggests that small carriers were over-represented in 1996 inspections and that large carriers were under-represented. This disparity was most pronounced for fleets of 1-10 power units, where over 2 times as many carriers were selected for inspection as was predicted by carrier representation on the nation's highways. Carriers with 11 to 50 power units performed almost as expected. On the other hand, carriers with fleets of 51 or more power units appeared to have been inspected less often than was predicted by their representation on the highways.

Table 2-11 shows violation and OOS violation counts by fleet size, and Figures 2-9 through 2-12 compare the violation and OOS violation rates. The data in the four figures suggest that there was a strong

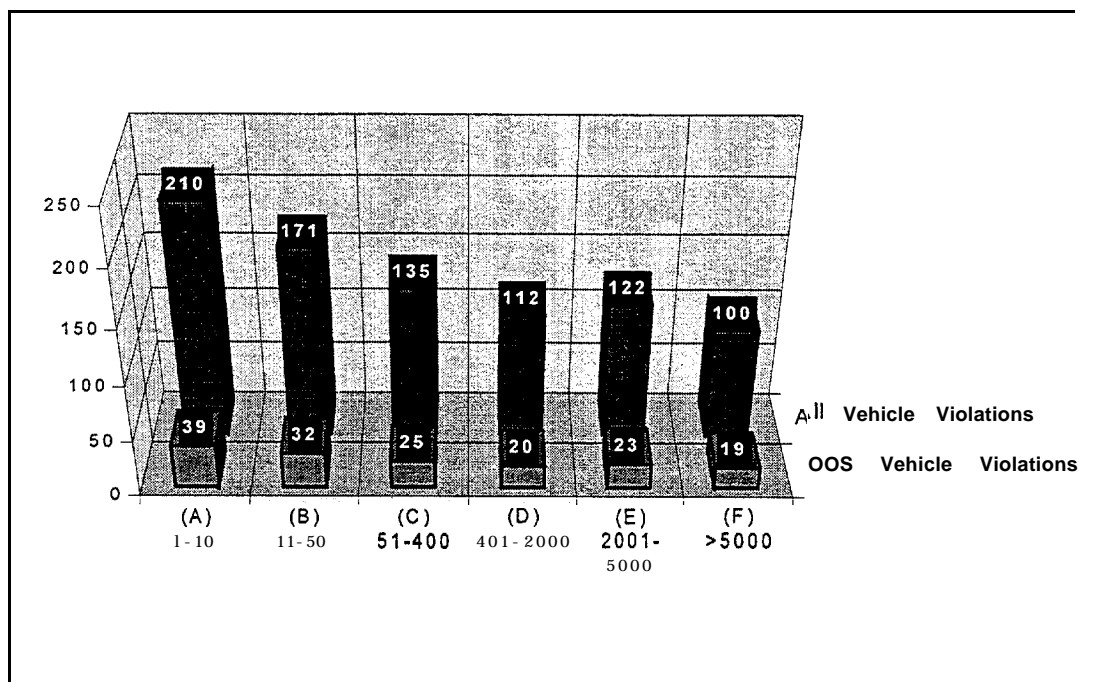
relationship between fleet size and inspection outcomes—namely, that as fleet size increased, violation rates decreased. As revealed in Figure 2-9, for example, carriers operating fleets of 1-10 power units experienced, on average, 96.4 percent more violations than did carriers operating over 5,000 units (279 versus 142 violations per 100 inspections). This basic trend was observed for each of the defect groups—vehicle, driver, and hazardous materials—except the violation rate for hazardous materials defects (Figure 2-12), which did not show any apparent trends.

Table 2- 11. Violations and OOS Violations by Fleet Size

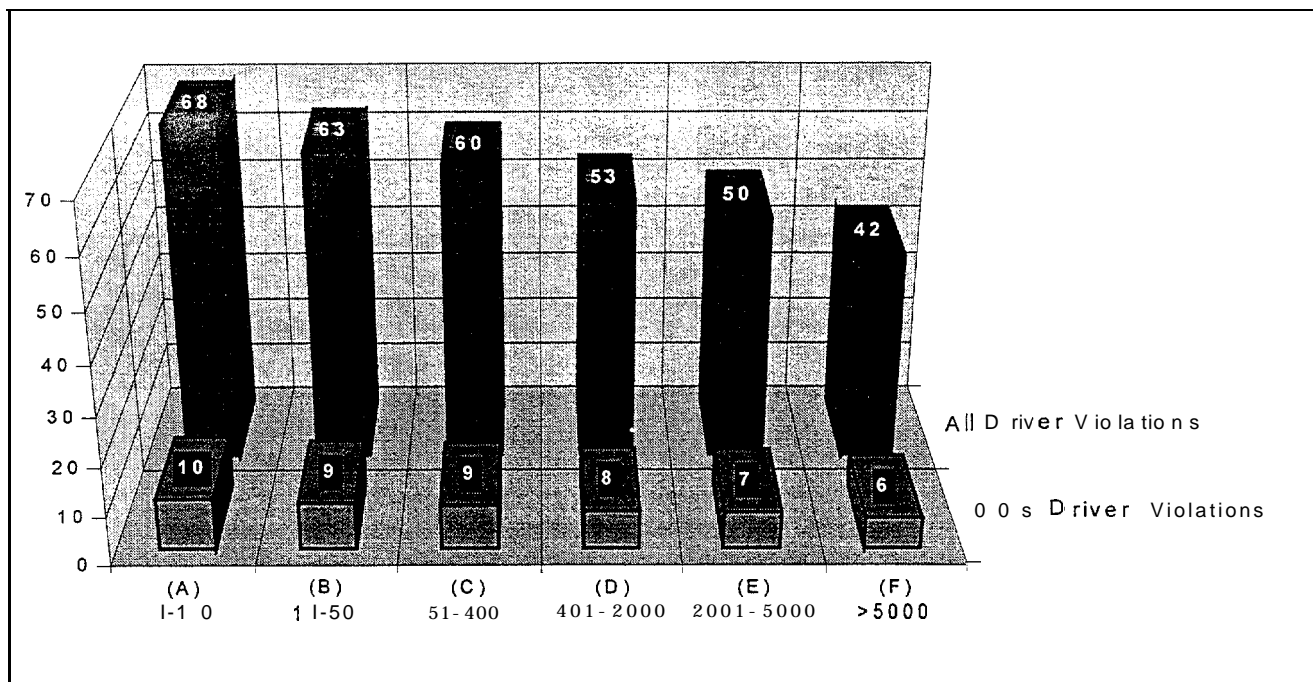
Fleet Size	All Violations	Percent	OOS Violations	Percent
1-10 (A)	979,383	29.3%	171,938	29.4%
11-50 (B)	718,534	21.5%	127,029	21.7%
51-400 (C)	608,109	18.2%	104,181	17.8%
401-2000 (D)	281,472	8.4%	47,992	8.2%
2001-5000 (E)	44,742	1.3%	7,870	1.3%
>5000 (F)	58,916	1.8%	10,546	1.8%
Other	655,504	19.6%	114,682	19.6%
Total	3,346,660	100.0%	584,238	100.0%



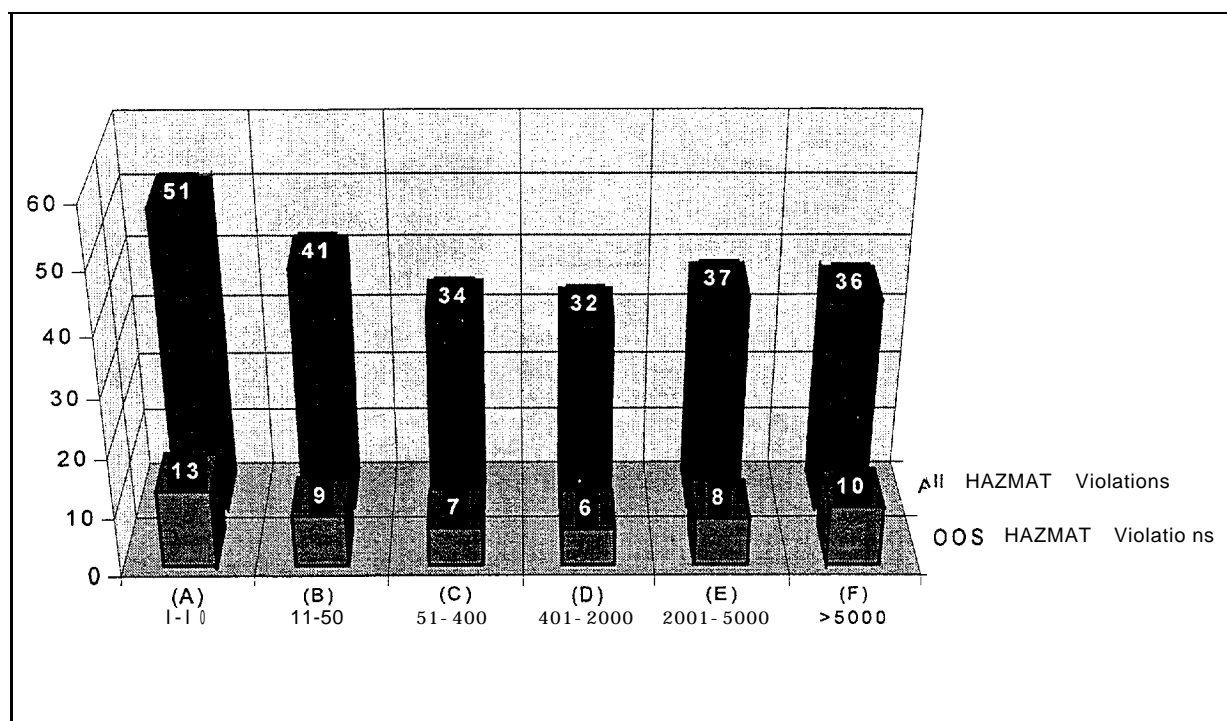
**Figure 2- 9. Violation and OOS Violation Rates
per 100 Inspections by Fleet Size
N=(1,470,077)**



**Figure 2- 10. Vehicle Violation and OOS Violation Rates
per 100 Inspections by Fleet Size
N=(1,470,077)**



**Figure 2- 11. Driver Violation and OOS Violation Rates
per 100 Inspections by Fleet Size
N=(1,470,077)**



**Figure 2- 12. HAZMAT Violation and OOS Violation Rates
per 100 HAZMAT Inspections by Fleet Size
N=(116,041)**

Figure 2-13 breaks down carrier fleet size into three categories-small, medium, and large-and examines the corresponding violation rates for specific vehicle, driver, and hazardous materials defects. From this figure, it can be inferred that fleet size had a significant impact on the identification of brake and lighting violations, little or no impact on hours-of-service violations, and marginal impact on violations resulting from improper placarding and improperly-prepared shipping papers. In other words, this display implies that while fleet size had a profound impact on overall inspection outcomes, the results were more mixed when individual defects were considered.

inspections; and (2) the violation rates for smaller carriers were usually higher than the rates for larger carriers. These findings, taken together, suggest that over-representation of smaller carriers may actually have been desirable and, perhaps, even beneficial. Since comparatively more defects were discovered during inspections of vehicles from smaller fleets, the controlled "over-sampling" of small-fleet vehicles likely resulted in the removal of a larger number of unfit vehicles and drivers from the roadways than would have been the case without the over-representation.

In summary, the data on fleet size support the following conclusions: (1) smaller carriers were over-represented in 1996

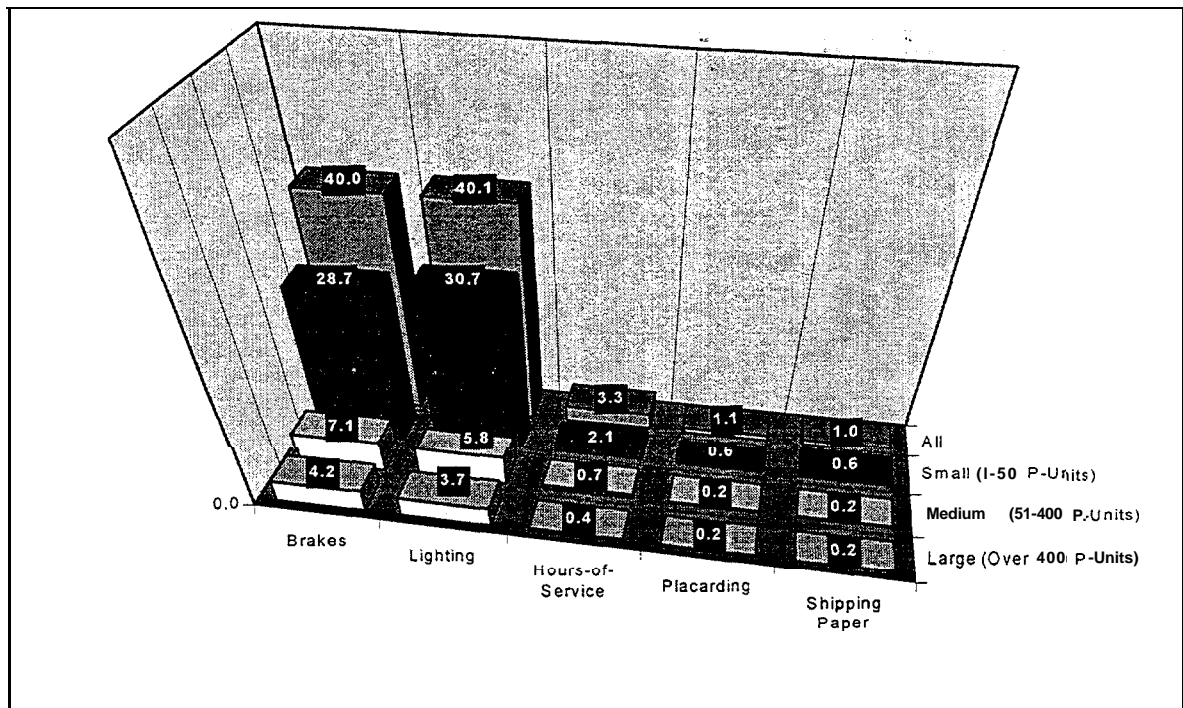


Figure 2- 13. Selected Defects by Fleet Size
Violation Rates per 100 Inspections
N=(1,470,077)

Vehicle Configuration

Vehicle configuration—that is, arrangement of the individual units (tractors, trailers, etc.) comprising a given vehicle—is identified at the outset of each inspection. In this report, the various configurations are grouped into seven common categories, as follows:

Tractor-Only. A self-propelled commercial truck-tractor with no additional unit such as a trailer or other cargo box attached. Normally, a vehicle in this configuration has already delivered its load and is returning to the point of origin for new assignments.

Straight Truck. A commercial vehicle in which the power unit and cargo box are non-detachable.

Tractor-Trailer/Single. A commercial vehicle consisting of a truck-tractor and a detachable trailer. Normally, the trailer in this configuration is a “semi-trailer.”

Tractor-Trailer/Double. A commercial vehicle consisting of a truck-tractor and two detachable trailers. Normally, the first trailer is a semi-trailer and the second is a “full trailer.” (A semi-trailer can be made to function as a full trailer using a device called a “dolly converter.”)

Tractor-Trailer/Triple. A commercial vehicle consisting of a truck-tractor and three detachable trailers. Normally, the first trailer is a semi-trailer and the second and third are full trailers.

Bus. A commercial vehicle designed and used to transport passengers.

Other. A commercial vehicle which does not fit any of the configurations described above. Examples include a tow vehicle pulling a commercial vehicle, a truck-tractor “piggy-backed” on another truck-tractor, two buses attached, etc. This category also includes “unknown” configurations which could not be definitively identified after the inspection was completed.

The vehicle configurations described above are graphically depicted in the Appendix.

As shown in Table 2-12, the vast majority of vehicles (74.5 percent) inspected in 1996 were tractor-trailers/singles. This was followed by straight trucks at 16.5 percent. Less than 3.0 percent of all inspections involved doubles or triples, and 1.4 percent involved buses.

Table 2-12. Inspections by Vehicle Configuration

Configuration Type	Number	Percent
Tractor-Only	69,748	4.1%
Straight Truck	279,147	16.5%
Tractor-Trailer/Single	1,258,679	74.5%
Tractor-Trailer/Double	37,922	2.2%
Tractor-Trailer/Triple	519	0.0%
Bus	22,865	1.4%
Other	20,189	1.2%
Total	1,689,069	100.0%

Table 2-1 3 identifies violation and OOS violation counts by vehicle configuration. Figures 2-14 through 2-17 compare the violation and OOS violation rates. In general, with the exception of triples, the OOS vehicle violation rates tended to increase as configuration lengths increased (Figure 2- 15). For instance, among the property-carrying vehicles, tractors-only had the lowest OOS vehicle violation rate (24 per 100 inspections), followed by straight trucks (28), singles (33), and doubles (45), respectively; triples had an OOS vehicle violation rate of 27 per 100 inspections.

(Among all vehicles-both property- and passenger-carrying-buses had the lowest OOS vehicle violation rate overall: 12 per 100 inspections.) However, while the rate differential between tractors-only, straight trucks, singles, and doubles was increasing significantly, the rate for the triples actually dropped significantly from the doubles. The pattern slightly changed when all vehicle violation rates were considered. The vehicle violation rates for tractor-only, straight trucks, singles, and doubles were 124, 178, 176, and 223, respectively.

Table 2- 13. Violations and OOS Violations by Vehicle Configuration

Configuration Type	All Violations		OOS Violations	
	Number	Percent	Number	Percent
Tractor-Only	129,088	3.2%	23,605	3.3%
Straight Truck	645,155	16.1%	98,727	14.0%
Tractor-Trailer/Single	3,015,055	75.2%	545,487	77.1%
Tractor-Trailer/Double	100,472	2.5%	18,947	2.7%
Tractor-Trailer/Triple	1,185	0.0%	170	0.0%
Bus	30,024	0.7%	3,170	0.4%
Other	90,046	2.2%	17,438	2.5%
Total	4,011,025	100.0%	707,544	100.0%

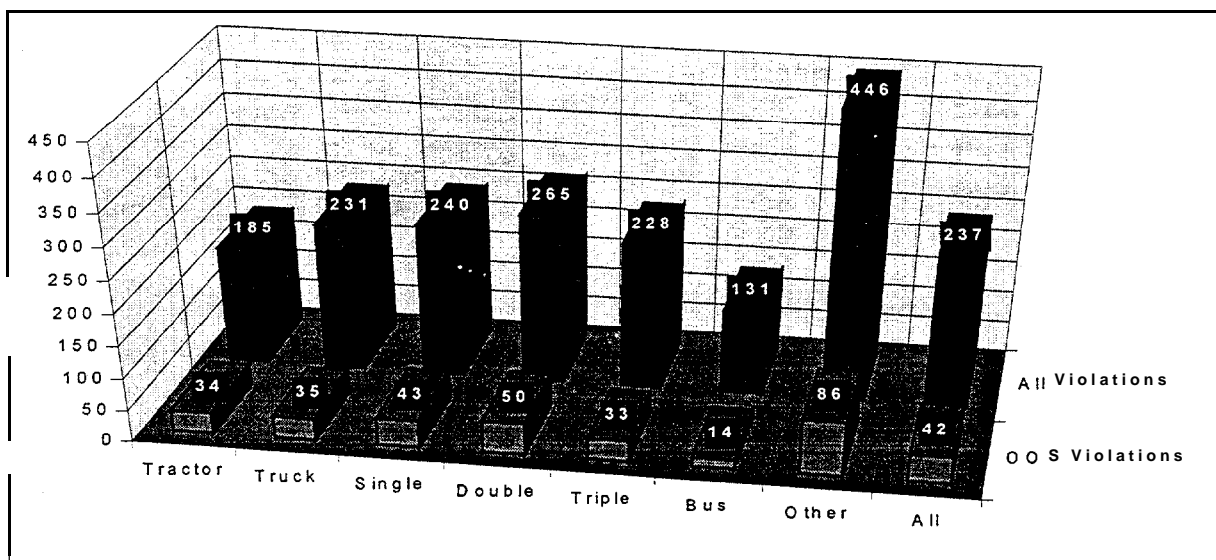
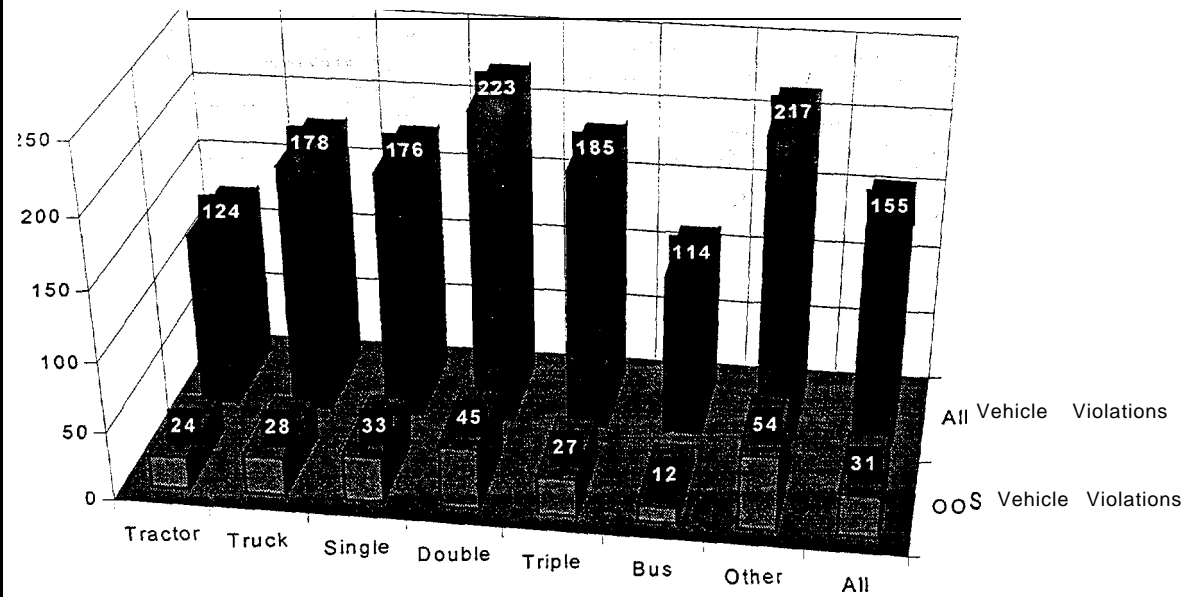
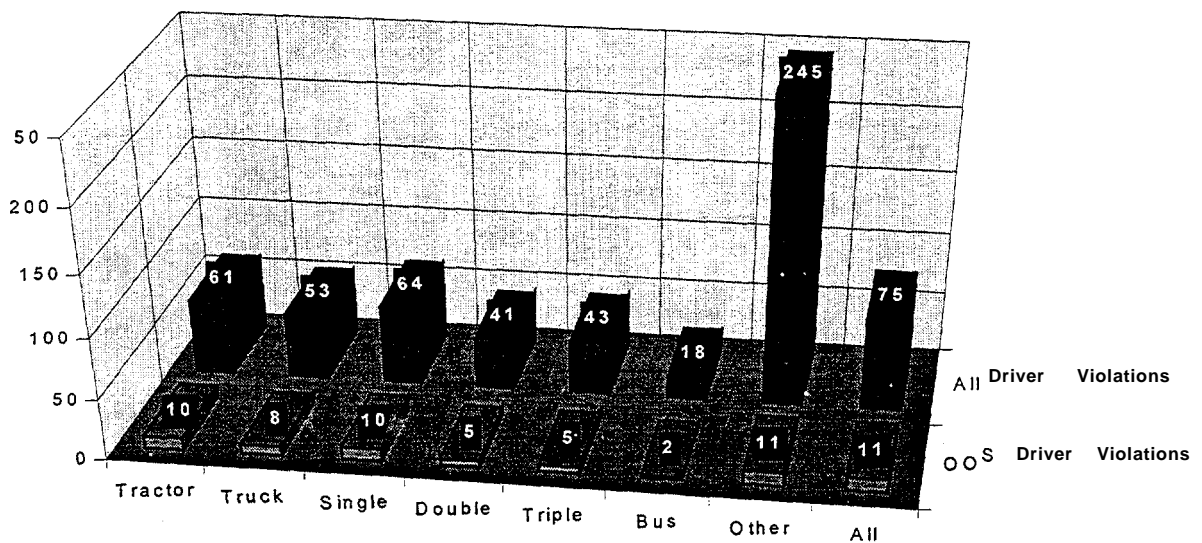


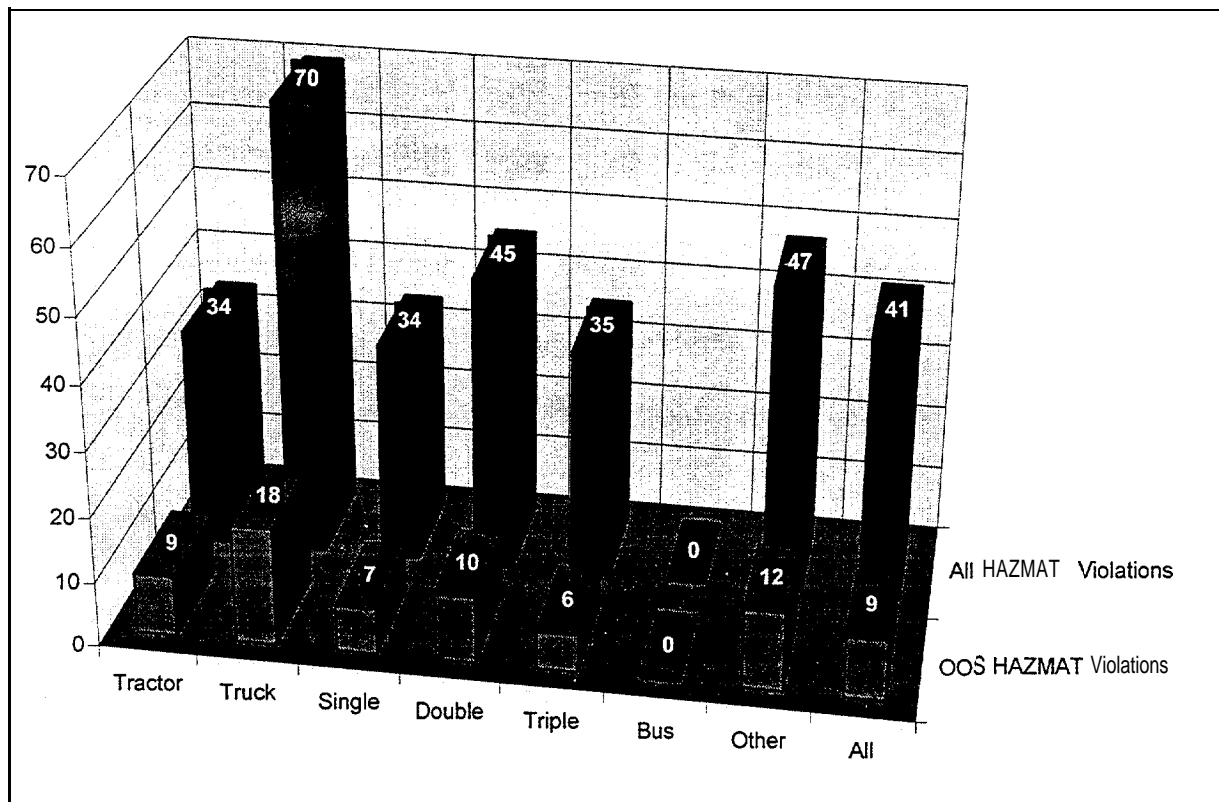
Figure 2- 14. Violation and OOS Violation Rates per 100 Inspections by Vehicle Configuration
N=(1,689,069)



**Figure 2- 15. Vehicle Violation and OOS Violation Rates
per 100 Inspections by Vehicle Configuration
N=(1,689,069)**



**Figure 2- 16. Driver Violation and OOS Violation Rates
per 100 Inspections by Vehicle Configuration
N=(1,689,069)**



**Figure 2- 17. HAZMAT Violation and OOS Violation Rates per 100 HAZMAT Inspections by Vehicle Configuration
N=(116,041)**

Whereas vehicle violation rates tended to *increase* with configuration length, driver violation rates appeared to *vary* with length (Figure 2-16). For example, the driver violation rates for tractor-only, straight trucks, singles, and doubles were 61, 53, 64, and 41, respectively. Although information on professional driving experience was not normally collected during inspections, the patterns observed here may well be explained by common suppositions about driver assignments, namely, that the drivers assigned to extremely large vehicles (i.e., doubles and triples) have more experience and better safety records than the professional driver population at large.

In general, with the exception of singles, the HAZMAT violation rates tended to increase as configuration lengths increased (Figure 2-17). The HAZMAT violation rates for tractor-only, straight trucks, singles, doubles, and triples were 34, 70, 34, 45, and 35, respectively.

Figure 2- 18 reveals that even the most basic patterns, identified above, can be elusive when individual defects are considered. For example, the rate of brake violations *increased* as vehicle configuration lengthened. At the same time, the rate of lighting defects *decreased*. The other types of defects, however, did not reveal any significant pattern because the rates were so low.

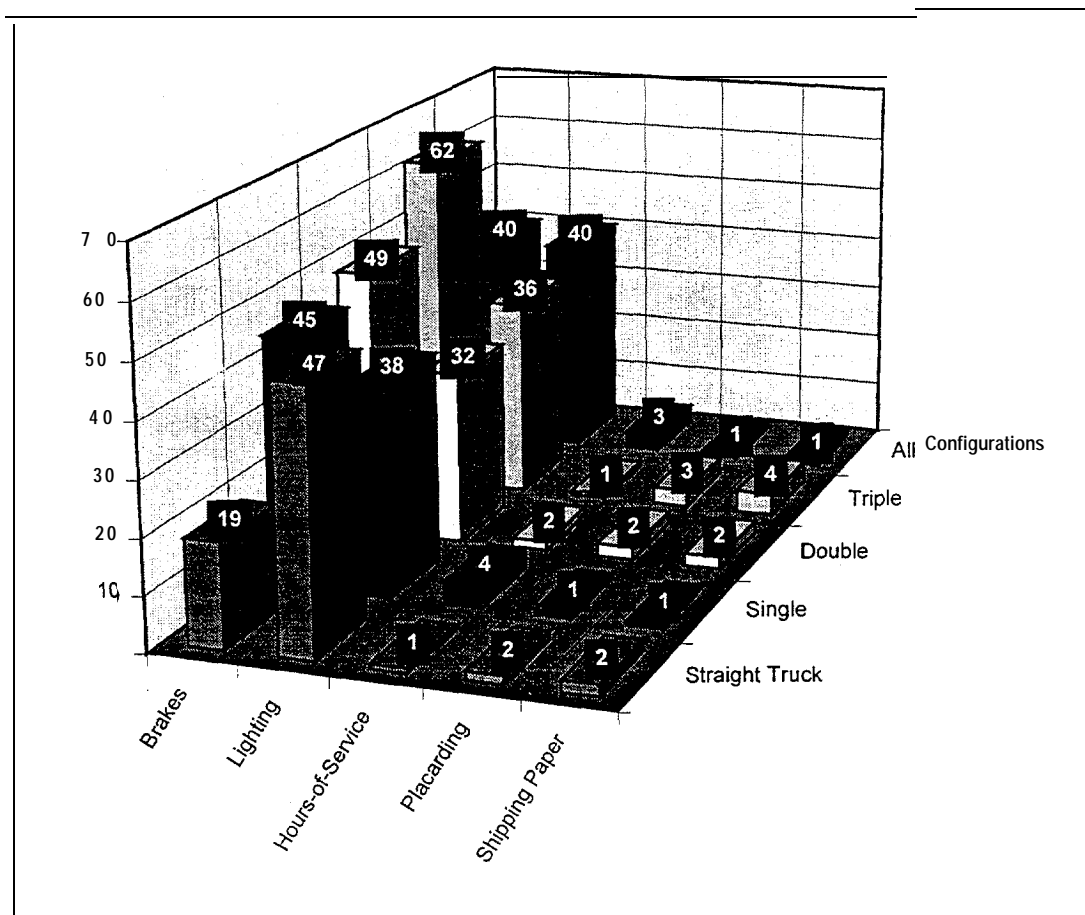


Figure 2- 18. Selected Defects by Vehicle Configuration
Violation Rates per 100 Inspections
N=(1,689,069)

Hazardous Materials

What was the relationship between the presence or non-presence of hazardous materials and inspection outcomes? To examine this question, the violation rates for vehicles transporting hazardous materials at the time of the inspection were compared to the rates for vehicles transporting non-hazardous materials only. The focus of the examination was on overall violation rates, and then on vehicle and driver violation rates. Comparisons of rates for hazardous material violations, of course, could not be made between the two sets of inspections.

Approximately 7 percent of all vehicles inspected in 1996 were transporting hazardous materials at the time of the inspection (Table 2-14). As shown in Figure 2-19, the overall violation rate when hazardous materials were onboard was 191 per 100 inspections versus 239 per 100 inspections when only non-hazardous materials were onboard. The vehicle

violation rate was 153 for hazardous materials versus 176 for non-hazardous materials, and the driver violation rate was 38 for hazardous materials versus 62 for non-hazardous materials.

Figure 2-20 compares violation rates for selected defects. Inspections where hazardous materials were present at the time of the inspection experienced, on average, 9 percent more brake violations, 29 percent fewer lighting violations, and 33 percent fewer hours-of-service violations than inspections where only non-hazardous materials were present.

**Table 2- 14. Inspection and Violation Counts
by Presence of Hazardous Materials**

	Hazardous Materials Onboard Vehicle		Non-Hazardous Materials Onboard Vehicle		Total	
	Number	Percent	Number	Percent	Number	Percent
Inspections	116,041	6.9%	1,573,028	93.1%	1,689,069	100.0%
All Violations	221,914	5.5%	3,789,111	94.5%	4,011,025	100.0%
OOS Violations	38,813	5.5%	668,731	94.5%	707,544	100.0%

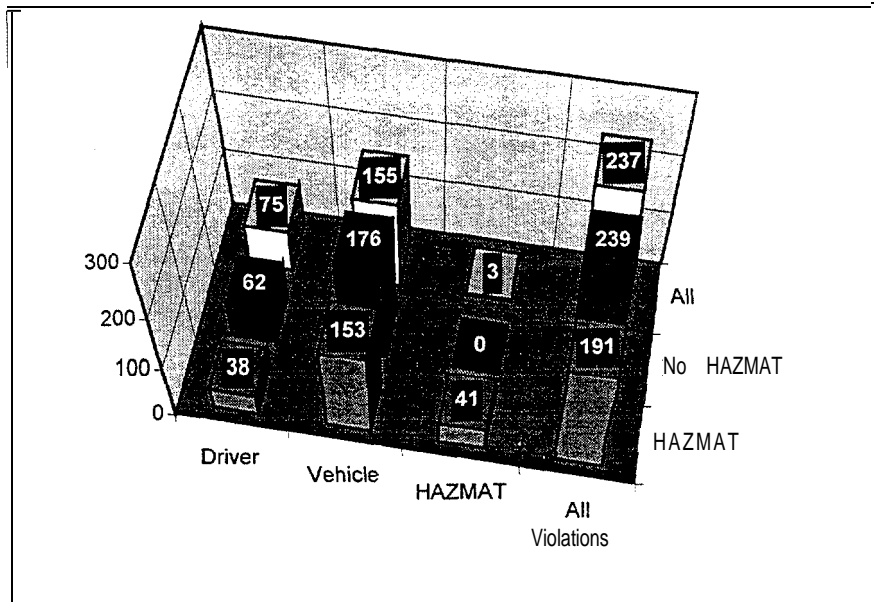


Figure 2- 19. Vehicle/Driver/HAZMAT Violation Rates per 100 Inspections by Presence of Hazardous Materials (N=1,689,069)

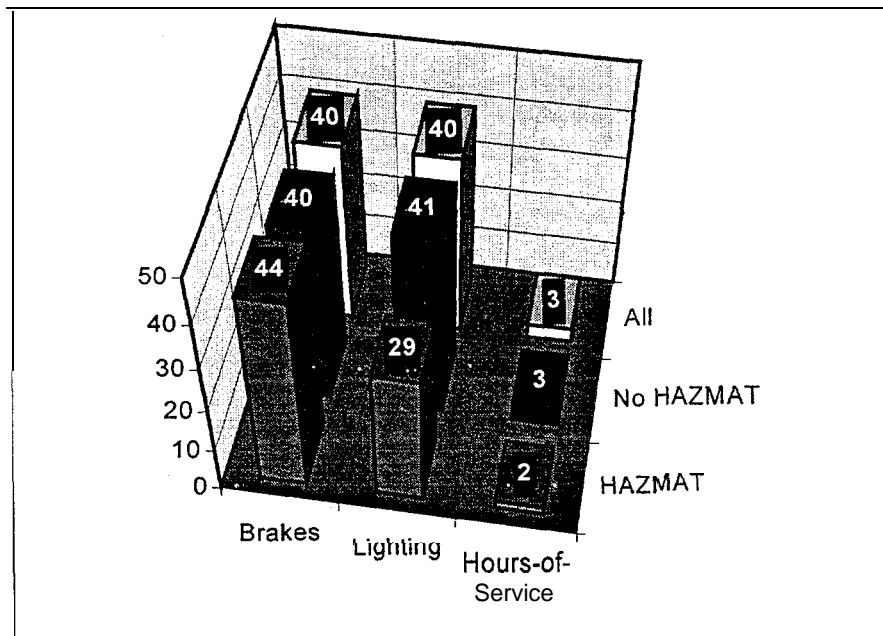


Figure 2- 20. Selected Defects by Presence of Hazardous Materials Violation Rates per 100 Inspections (N=1,689,069)

CHAPTER 3

The Impact of the Inspection Environment

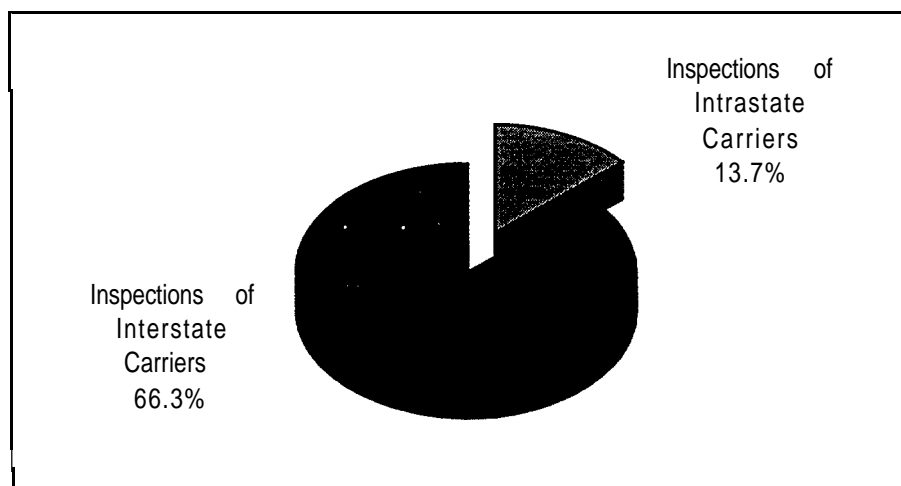
Location
Facility
Season
Time-of-Day
Duration

All States and most U.S. territories participated in the 1996 MCSAP inspection program. States exercised generally broad discretion over how best to structure and prioritize their individual programs. Inspections were variously conducted at *fixed* and *mobile* facilities; inspections at mobile facilities tended to result in higher violation rates. Fewer inspections were performed in Winter than during the rest of the year; Winter inspections generally resulted in lower violation rates. Of all inspections, 81.9 percent were conducted between 6 AM and 6 PM, with the heaviest concentration of activities occurring before noon. Daytime inspections produced higher violation rates than did nighttime inspections. The average inspection was 29.1 minutes in length; longer inspections resulted in more violations. Full

Inspections, of all the inspection methodologies, produced the highest violation rates per hour of inspection activity.

Location

Of all inspections conducted in 1996, 86.3 percent involved interstate carriers (Figure 3-1). Nearly all of these inspections were performed by State personnel. A statistically insignificant proportion of the interstate inspections (0.01 percent) were performed by Federal safety investigators.



**Figure 3- 1. Proportion of 1996 Inspections Involving Non-Interstate Carriers
(N=1,956,665)**

Tables 3- 1 through 3-4 summarize 1996 interstate inspection activity by State. In reviewing these data, the following factors should be taken into account:

- The data does not reflect the 267,596 inspections of intrastate carriers completed in 1996.
- Two U.S. territories *did not* participate in MCSAP in 1996: the Northern Marianas and the Virgin Islands.

Data in the tables for individual States may be compared to the totals for all States to determine State standings against the national norms. For instance, Table 3-2 supports the comparison of violation rates, OOS violations rates, and violation-to-OOS violation ratios. (Remember that lower ratios mean that higher percentages of violations resulted in out-of-service citations.)

Table 3-4 identifies the percentage of inspections in each State which were Full Inspections and the mean duration of Full Inspections when they were conducted. By studying these tables, much can be learned about individual States' 1996 inspection activities. For example, State-by-State comparisons reveal that higher percentages of Full Inspections (Table 3-4) were frequently, but not exclusively, associated with lower counts of total inspections (Table 3-1), but higher violation rates per inspection (Tables 3-2 and 3-3). Among those States which conducted comparable percentages of Full Inspections (Table 3-4), longer inspection duration tended to correlate positively with higher violation rates (Tables 3-2 and 3-3).

The States, clearly, had different perspectives on whether to perform (1) less comprehensive inspections on a larger volume of vehicles, or (2) more comprehensive inspections on fewer vehicles.

Table 3- 1. Inspections, Violations, and OOS Violation Counts by State (Interstate Only)

State	Inspections	All Violations	OOS Violations
Alabama	18,559	59,548	6,539
Alaska	689	2,677	370
American Samoa	271	381	119
Arizona	29,967	107,631	11,407
Arkansas	36,157	66,093	15,439
California	252,893	400,651	98,624
Colorado	40,564	95,376	14,029
Connecticut	14,138	54,404	11,472
Delaware	2,666	5,247	1,358
District of Columbia	3,884	5,961	799
Florida	45,401	102,436	18,054
Georgia	27,223	61,800	11,652
Guam	14	71	34
Hawaii	3,682	9,435	1,186
Idaho	5,912	17,045	2,742
Illinois	68,564	119,026	14,146
Indiana	73,612	190,774	23,945
Iowa	41,647	94,471	10,840
Kansas	21,306	56,200	8,614
Kentucky	64,324	125,396	29,668
Louisiana	34,024	89,070	11,934
Maine	4,453	11,522	3,058
Maryland	91,419	155,573	27,121
Massachusetts	22,431	64,671	11,586
Michigan	38,098	135,316	11,920
Minnesota	20,844	76,771	10,354
Missouri	63,569	211,250	38,581
Mississippi	18,655	39,012	9,989
Montana	22,760	22,215	4,458
Nebraska	20,407	25,743	6,092
Nevada	12,602	22,440	2,878
New Hampshire	13,465	25,512	2,887
New Jersey	47,080	165,543	18,523
New Mexico	23,328	54,260	11,792
New York	26,616	63,651	21,455
North Carolina	23,693	49,387	9,510
North Dakota	14,152	17,919	3,034
Ohio	49,957	165,990	30,887
Oklahoma	6,988	16,030	3,087
Oregon	19,377	48,661	10,625
Pennsylvania	44,602	147,362	21,041
Puerto Rico	823	1,653	342
Rhode Island	4,890	13,022	1,690
South Carolina	30,846	101,310	15,691
South Dakota	15,618	15,609	2,953
Tennessee	38,188	57,718	13,498
Texas	67,588	246,327	42,675
Utah	13,155	35,984	5,448
Vermont	4,976	13,737	1,946
Virginia	39,788	85,152	15,631
Washington	58,682	125,579	23,614
West Virginia	9,248	14,092	4,011
Wisconsin	19,642	46,728	9,790
Wyoming	12,947	25,841	5,306
OTHER	2,685	38,752	7,100
All States	1,689,069	4,011,025	707,544

**Table 3- 2. Violation Rates per 100 Inspections and
Ratio of Total Violations to OOS Violations**

State	Violation Rate	OOS Violation Rate	Violations to OOS Violations
Alabama	321	35	9.1
Alaska	389	54	7.2
American Samoa	141	44	3.2
Arizona	359	38	9.4
Arkansas	183	43	4.3
California	158	39	4.1
Colorado	2351	35	6.8
Connecticut	3851	81	4.7
Delaware	197	51	3.9
District of Columbia	153	21	7.5
Florida	226	40	5.7
Georgia	227	43	5.3
Guam	507	243	2.1
Hawaii	256	32	a.0
Idaho	288	44	6.2
Illinois	174	21	a.4
Indiana	259	33	a.0
Iowa	227	36	6.4
Kansas	264	40	6.5
Kentucky	195	46	4.2
Louisiana	262	35	7.5
Maine	259	69	3.8
Maryland	170	30	5.7
Massachusetts	288	52	5.6
Michigan	355	31	11.4
Minnesota	368	50	7.4
Mississippi	209	54	3.9
Missouri	332	61	5.5
Montana	98	20	5.0
Nebraska	126	30	4.2
Nevada	234	39	6.0
New Hampshire	189	71	2.8
New Jersey	3521	39	8.9
New Mexico	2331	51	4.6
New York	239	81	3.0
North Carolina	208	40	5.2
North Dakota	127	21	5.9
Ohio	332	62	5.4
Oklahoma	229	44	5.2
Oregon	251	55	4.6
Pennsylvania	330	47	7.0
Puerto Rico	201	42	4.8
Rhode Island	266	35	7.7
South Carolina	328	51	6.5
South Dakota	100	19	5.3
Tennessee	101	30	4.5
Texas	364	63	5.8
Utah	274	41	6.7
Vermont	276	39	7.1
Virginia	214	39	5.4
Washington	214	40	5.3
West Virginia	152	43	3.5
Wisconsin	238	50	4.8
Wyoming	200	41	4.9
All States	237	42	5.7

**Table 3- 3. Vehicle, Driver, and HAZMAT Violations and
OOS Violation Rates per 100 Inspections**

State	All Vehicle	OOS Vehicle	All Driver	OOS Driver	All Hazmat	OOS Hazmat
Alabama	214	27	107	8	3	1
Alaska	323	46	66	7	6	2
American Samoa	136	42	4	1	0	0
Arizona	228	25	132	13	2	0
Arkansas	115	24	68	19	1	0
California	147	34	12	5	2	0
Colorado	184	27	51	7	4	1
Connecticut	293	66	91	16	6	2
Delaware	141	39	56	12	3	1
District of Columbia	126	19	28	2	1	0
Florida	182	31	43	9	2	1
Georgia	152	33	75	10	7	2
Guam	507	243	0	0	0	0
Hawaii	251	31	5	1	5	2
Idaho	197	30	91	17	15	3
Illinois	108	15	65	5	7	0
Indiana	164	25	95	7	3	0
Iowa	132	23	94	13	4	1
Kansas	157	24	107	16	2	0
Kentucky	157	35	38	11	2	1
Louisiana	158	21	104	14	3	0
Maine	228	54	30	15	4	1
Maryland	132	23	39	7	2	0
Massachusetts	212	46	76	6	7	1
Michigan	256	27	99	4	0	0
Minnesota	255	37	113	13	1	0
Mississippi	158	43	52	11	2	1
Missouri	260	49	72	12	4	1
Montana	53	10	45	10	1	0
Nebraska	56	14	70	16	1	0
Nevada	177	30	56	9	7	1
New Hampshire	130	15	59	7	2	0
New Jersey	293	36	58	4	2	0
New Mexico	156	34	76	17	2	1
New York	207	73	32	8	6	2
North Carolina	156	32	53	9	2	1
North Dakota	48	11	78	10	0	0
Ohio	254	49	79	12	8	2
Oklahoma	164	36	65	8	3	1
Oregon	190	42	61	13	1	0
Pennsylvania	238	39	92	8	4	1
Puerto Rico	114	39	87	2	28	7
Rhode Island	160	25	106	9	4	1
South Carolina	264	43	64	7	20	5
South Dakota	60	6	40	13	1	0
Tennessee	99	23	52	12	1	0
Texas	285	47	80	16	5	1
Utah	186	32	87	10	2	0
Vermont	178	25	98	15	5	0
Virginia	169	29	45	10	3	1
Washington	146	29	68	11	2	1
West Virginia	115	34	37	9	2	0
Wisconsin	182	38	55	12	1	0
Wyoming	80	19	119	22	4	1
All States	155	31	75	11	3	1

Table 3- 4. Percent Full Inspections and Mean Inspection Duration

State	Percent of Full Inspections	Mean Duration of Full Inspection (minutes)
Alabama	13.4%	30.9
Alaska	23.5%	45.1
American Samoa	80.1%	23.0
Arizona	18.5%	40.5
Arkansas	31.6%	34.2
California	86.0%	22.2
Colorado	46.9%	22.9
Connecticut	36.2%	49.7
Delaware	49.4%	26.4
District of Columbia	29.9%	26.1
Florida	38.4%	35.9
Georgia	30.2%	33.4
Guam	100.0%	30.1
Hawaii	84.4%	28.4
Idaho	46.0%	33.3
Illinois	12.6%	39.0
Indiana	29.6%	46.9
Iowa	30.9%	49.5
Kansas	12.7%	28.4
Kentucky	71.7%	33.1
Louisiana	34.8%	23.7
Maine	81.7%	24.9
Maryland	24.8%	30.3
Massachusetts	52.8%	45.6
Michigan	15.5%	48.0
Minnesota	39.7%	33.1
Mississippi	73.6%	40.3
Missouri	40.1%	43.7
Montana	25.1%	39.7
Nebraska	22.4%	28.0
Nevada	21.3%	34.0
New Hampshire	10.7%	36.1
New Jersey	34.9%	41.7
New Mexico	29.6%	36.4
New York	78.8%	27.5
North Carolina	45.9%	35.2
North Dakota	17.1%	27.0
Ohio	34.8%	44.2
Oklahoma	30.8%	33.1
Oregon	52.3%	25.4
Pennsylvania	44.1%	52.5
Puerto Rico	14.9%	33.1
Rhode Island	40.4%	35.3
South Carolina	24.8%	51.1
South Dakota	5.0%	46.2
Tennessee	21.4%	38.9
Texas	21.3%	34.8
Utah	43.2%	35.9
Vermont	34.1%	56.1
Virginia	36.0%	33.0
Washington	31.6%	32.2
West Virginia	52.7%	30.1
Wisconsin	34.0%	41.0
Wyoming	18.4%	44.6
All States	41.6%	32.4

Facility

Most inspections in 1996 were conducted at either *fixed* or *mobile* facilities. "Fixed" facilities included scales and other permanent inspection sites. "Mobile" or "roadside" facilities were those which could be easily relocated to different places, as conditions warranted. For example, a mobile inspection facility might be temporarily established along a secondary road near a junction with an interstate highway. As revealed in Figure 3-2, comparable volumes of inspections were conducted at fixed facilities (49.1 percent) versus mobile facilities (50.9 percent).

Tables 3-5 and 3-6 summarize inspection activity by facility type. As shown in the latter table, 50.7 percent of all inspections at fixed facilities were Full Inspections, as compared to only 32.8 percent at mobile facilities. The reverse was true for Walk-Around Inspections-26.2 percent of all inspections at fixed facilities were Walk-Arounds, as compared to 46.3 percent at mobile facilities. In other words, Full Inspections predominated at fixed facilities, whereas Walk-Arounds were performed most often at mobile inspection sites.

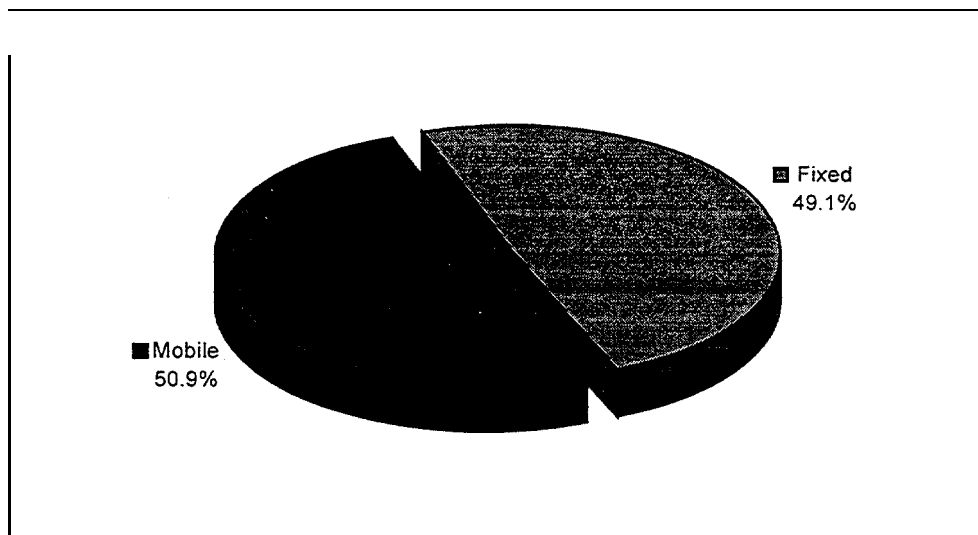


Figure 3- 2. Inspections by Facility Type

Table 3- 5. Inspection and Violation Counts by Facility Type

	Fixed		Mobile		Unknown		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Inspections	829,553	49.1%	829,553	50.9%	1	0.0%	1,689,069	100.0%
Violations	1,779,893	44.4%	2,199,544	54.8%	31,588	0.8%	4,011,025	100.0%
OOS Violations	356,778	50.4%	346,482	49.0%	4,284	0.6%	707,544	100.0%

Table 3- 6. Proportion of Inspections by Facility Type and Inspection Level

	Fixed	Mobile	Other/ Unknown	All
Full	50.7%	32.8%	0.0%	41.6%
Walk-Around	26.2%	46.3%	0.0%	36.4%
Driver-Only	20.1%	19.6%	100.0%	19.9%
Special	1.0%	0.9%	0.0%	1.0%
Terminal	1.9%	0.4%	0.0%	1.2%
Total	100.0%	100.0%	100.0%	100.0%
Total Inspections	829,553	859,515	1	1,689,069

Figures 3-3 through 3-6 compare violation rates by facility type. The overall violation rates for fixed and mobile sites were essentially identical—215 versus 256 violations, respectively, per 100 inspections (Figure 3-3). However, examination of individual vehicle, driver, and hazardous materials violation rates by facility type reveals significant differences. For instance, the vehicle violation rate was 7.6 percent lower at fixed, as opposed to mobile, facilities (Figure 3-4). In contrast, the driver violation rate was 37.0 percent higher—and the hazardous materials violation rate was 29.5 percent higher—at mobile facilities than at fixed facilities (Figures 3-5 and 3-6). Of course, some of these differences can be explained by the inspection levels which predominated among the two facility types. For example, as previously observed, Full Inspections appeared to best identify *vehicle* violations, whereas Walk-Arounds and Driver-Only Inspections most aptly identified *driver* violations. It is unlikely that the differences in violation rates between the facility types, however, can be totally explained by inspection level since inspections at both types of facilities involved a mix of inspection levels. After

all, while the proportion of Driver-Only Inspections was essentially the same at mobile facilities and fixed facilities, the driver violation rate was 37.0 percent higher at mobile facilities.

Interestingly, the OOS rates by facility type tended not to mirror violation rates generally. For instance, Figure 3-5 shows that although the driver violation rate at mobile facilities was markedly higher than at fixed facilities (74 versus 47 violations per 100 inspections), the OOS rate for drivers was, in fact, highest at fixed facilities (10 versus 8). Overall, the ratio of violations-to-OOS violations was lowest at fixed facilities (Figure 3-7).

Figures 3-8 through 3-10 examine selected defects by facility type. Whereas brake violations were most likely to be identified, as expected, at fixed facilities, the identification of lighting violations was the same at fixed and mobile facilities (Figure 3-8). Note that mobile facilities were more likely than fixed facilities to identify shipping paper violations (Figure 3-10).

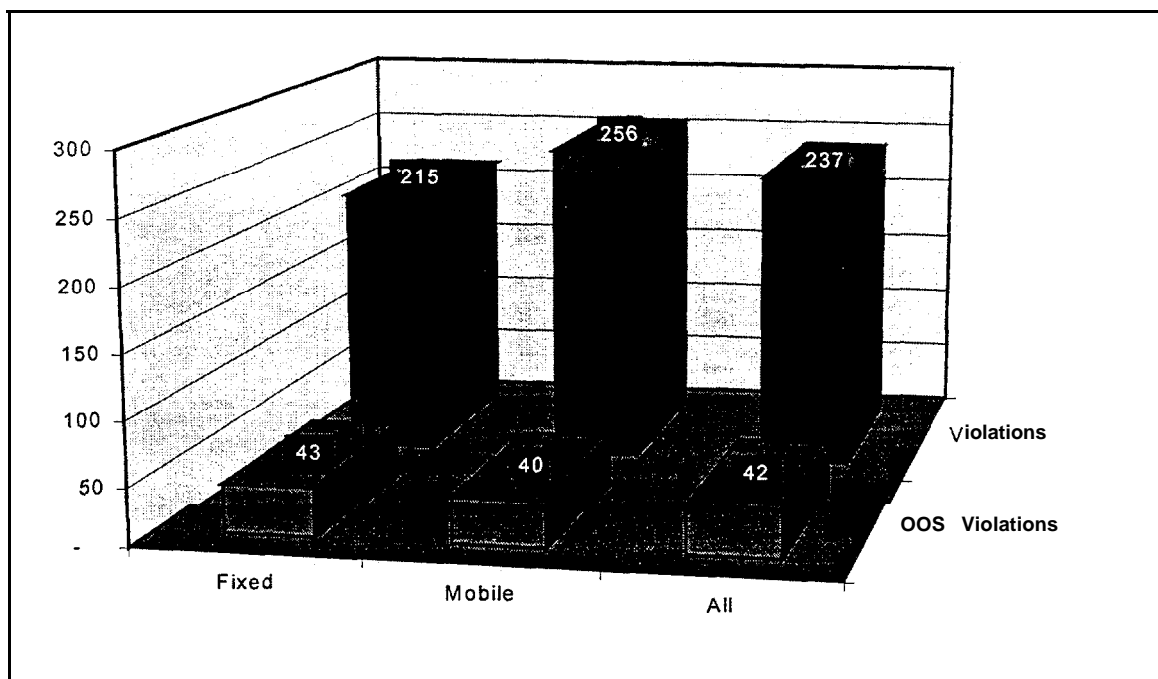


Figure 3-3. Violation and OOS Violation Rates per 100 Inspections by Facility Type (N=1,689,069)

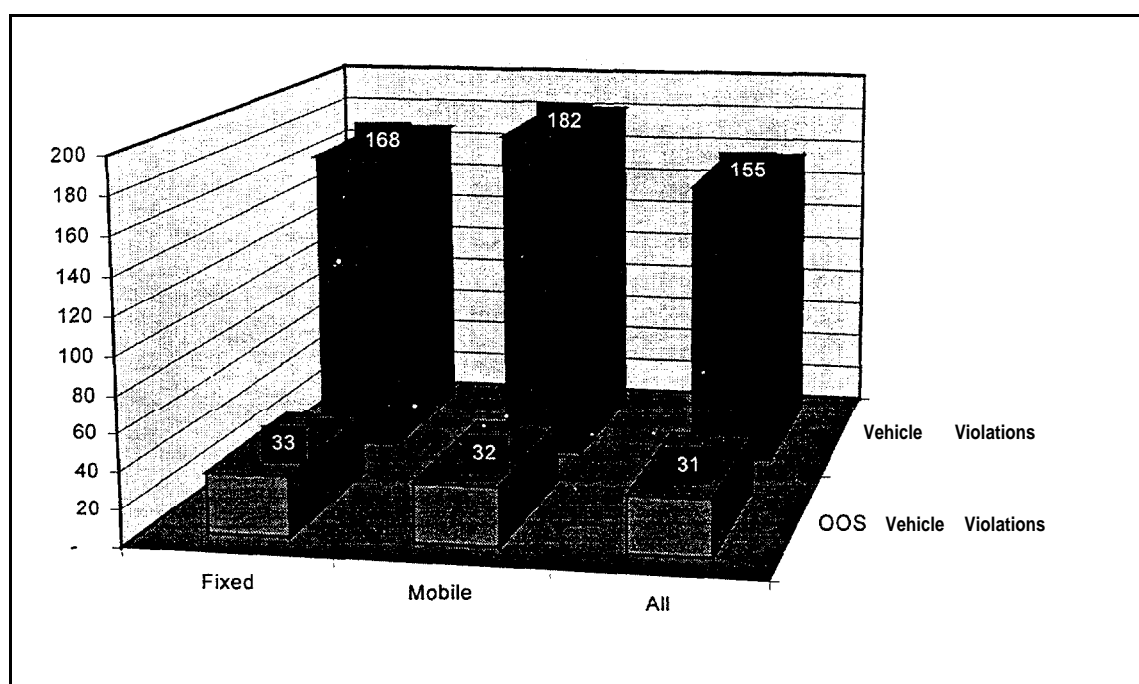
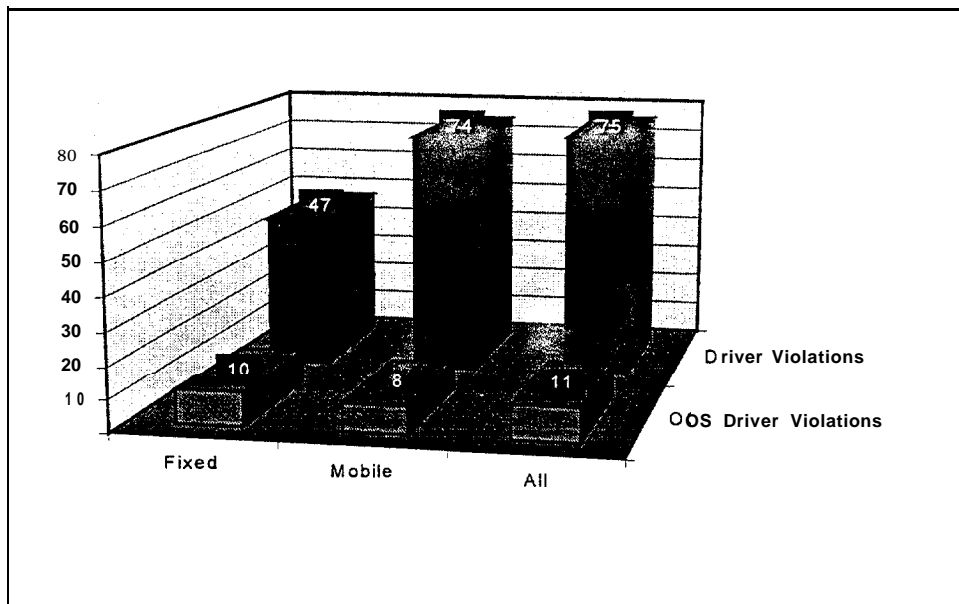
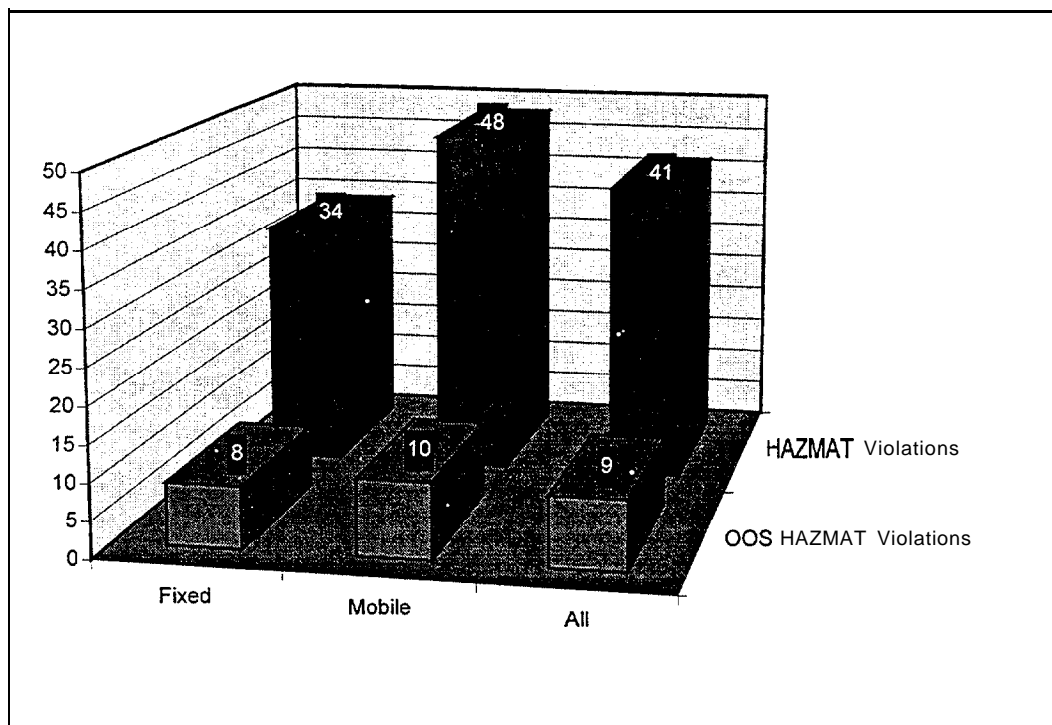


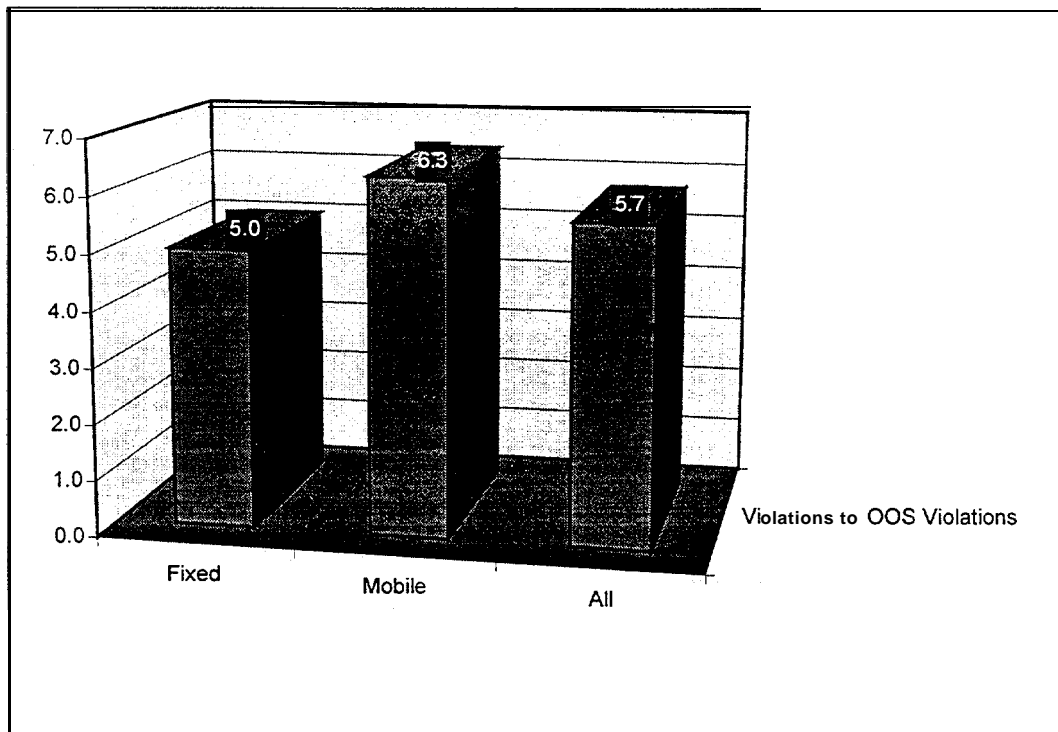
Figure 3-4. Vehicle Violation and OOS Violation Rates per 100 Inspection by Facility Type (N=1,689,069)



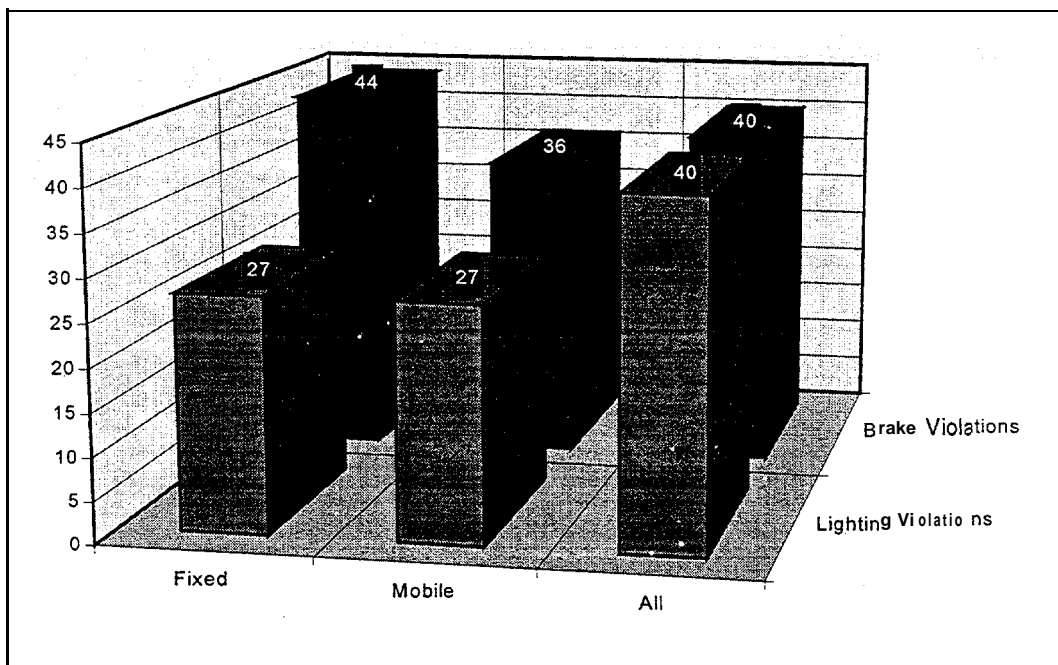
**Figure 3-5. Driver Violation and OOS Violation Rates
per 100 Inspections by Facility Type
(N=1,689,069)**



**Figure 3-6. HAZMAT Violation and OOS Violation Rates
per 100 HAZMAT Inspections by Facility Type
(N=116,041)**



**Figure 3-7. Ratio of Total Violations to Out-of-Service Violations
by Facility Type
(N=1,689,069)**



**Figure 3-8. Brake/Lighting Defects by Facility Type
Violation Rates per 100 Inspections
(N=1,689,069)**

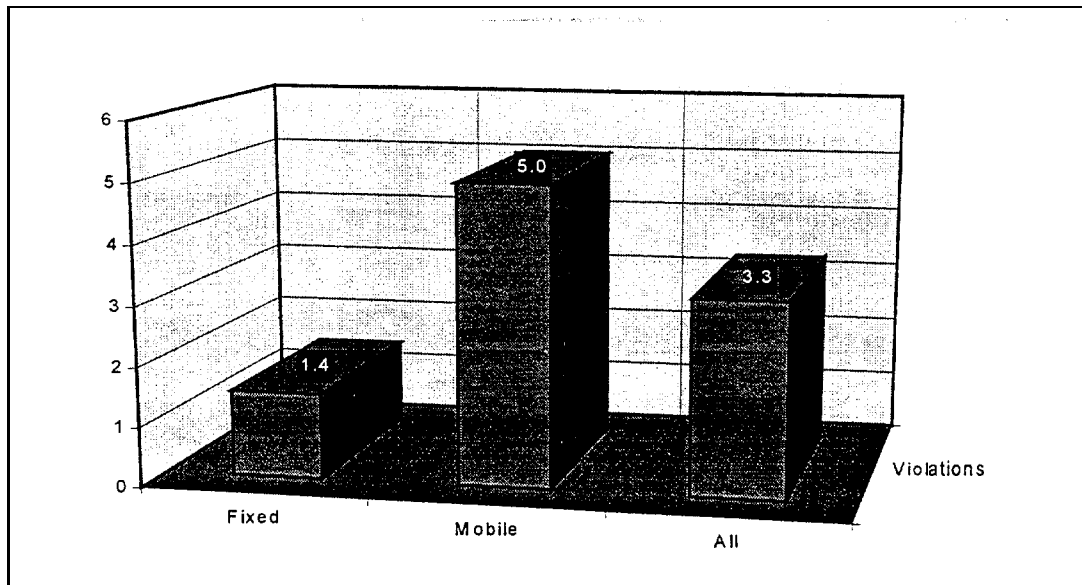


Figure 3-9. Hours-of-Service Defects by Facility Type
Violation Rates per 100 Inspections
(N=1,689,069)

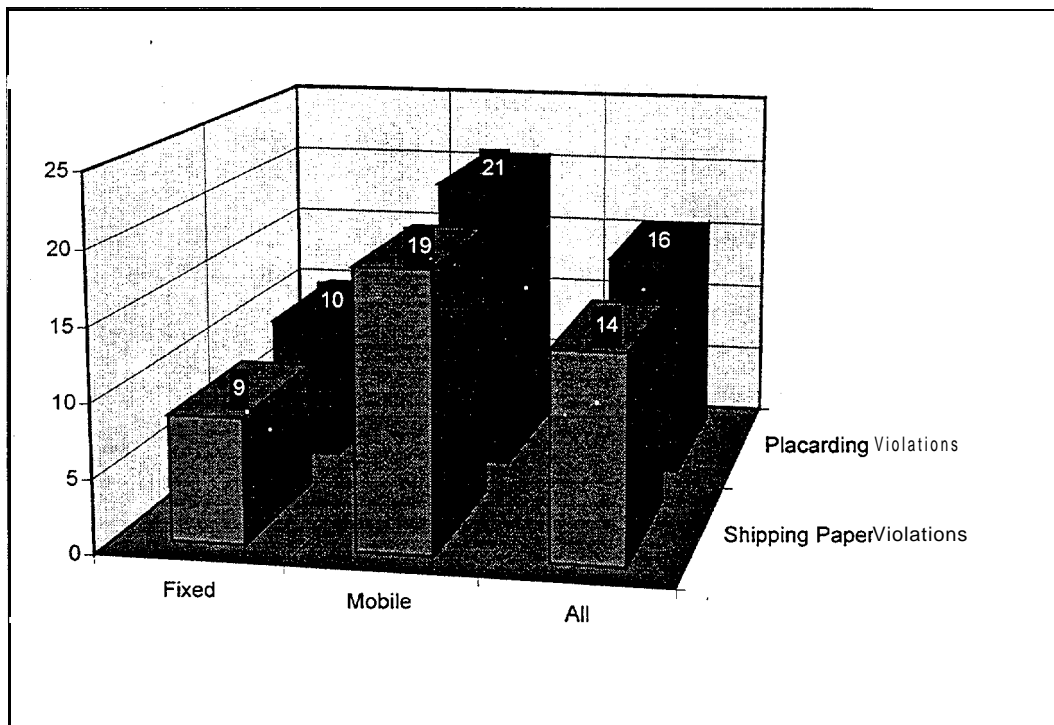


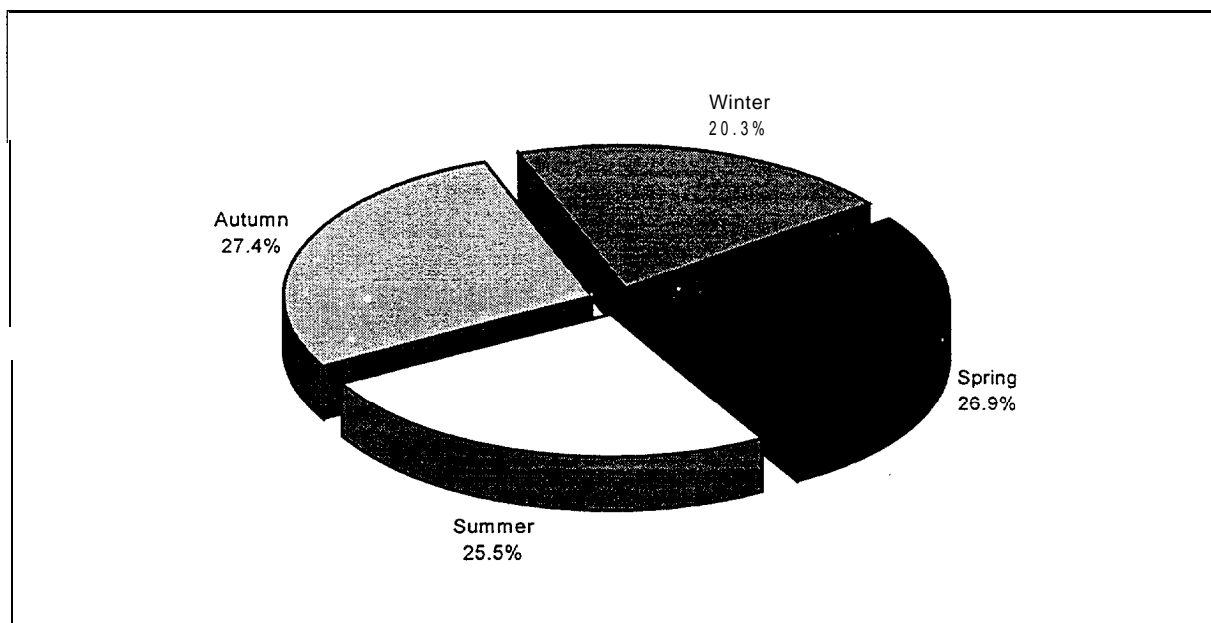
Figure 3-10. Placarding/Shipping Paper Defects by Facility Type
Violation Rates per 100 HAZMAT Inspections
(N=116,541)

Season

To examine inspection activity by season, inspection “months” were grouped as follows: January-March: Winter; April-June: Spring; July-September: Summer; and October-December: Autumn. Inspection activity was fairly constant during the Spring, Summer, and Autumn, but dropped off somewhat in the Winter—4 out of 5 inspections performed in 1996 occurred during the Spring, Summer, and Autumn seasons (Figure 3-11).

Table 3-7 compares inspection and violation activity by season, and Table 3-8 displays seasonal activity by inspection level. As shown in the latter table, proportionally more Full Inspections were conducted in Spring and Summer, whereas Walk-Arounds were performed with greater frequency in Winter. Though the differences were not dramatic, violation rates did appear to vary by season (Figures 3-12 through 3-15).

Aggregate violation rates were highest in the Spring and Summer (246 and 244 per 100 inspections, respectively) and lowest in the Autumn and Winter (227 and 233, respectively). OOS violation rates were highest in the Spring (44) and lowest in Winter (40) and Autumn (40). Vehicle violation rates ranged from 147 in Winter to 164 in Spring (Figure 3-13), but Driver Violation rates were nearly identical throughout the year with Winter having the highest rate of 81 (Figure 3-14). The hazardous materials violation rate was slightly higher in Summer (43) than in any other season (Figure 3-15). These results may be explained, in part, by the fact that a higher proportion of Full Inspections were performed in Summer than in Winter, whereas the proportion of Walk-Arounds and Driver-Only Inspections was highest in Winter (Table 3-8).



**Figure 3- 11. Inspections-by Season
(N=1,689,069)**

Table 3- 7. Inspection and Violation Counts by Season

	Winter	Spring	Summer	Autumn	Total
Inspections (Number)	342,393	453,904	430,607	462,165	1,689,069
Inspections (Percent)	20.3%	26.9%	25.5%	27.4%	100.0%
Violations (Number)	796,495	1,114,995	1,048,758	1,050,777	4,011,025
Violations (Percent)	19.9%	27.8%	26.1%	26.2%	100.0%
OOS Violations (Number)	135,393	199,744	186,659	185,748	707,544
OOS Violations (Percent)	19.1%	28.2%	26.4%	26.3%	100.0%

Table 3-8. Proportion of Inspections by Season and Inspection Level

	Winter	Spring	Summer	Autumn	All
Full	34%	45%	44%	41%	42%
Walk-Around	41%	35%	33%	37%	36%
Driver-Only	23%	18%	18%	21%	20%
Special	0%	1%	2%	0%	1%
Terminal	1%	1%	2%	1%	1%
Total Inspections	342,393	453,904	430,607	462,165	1,689,069

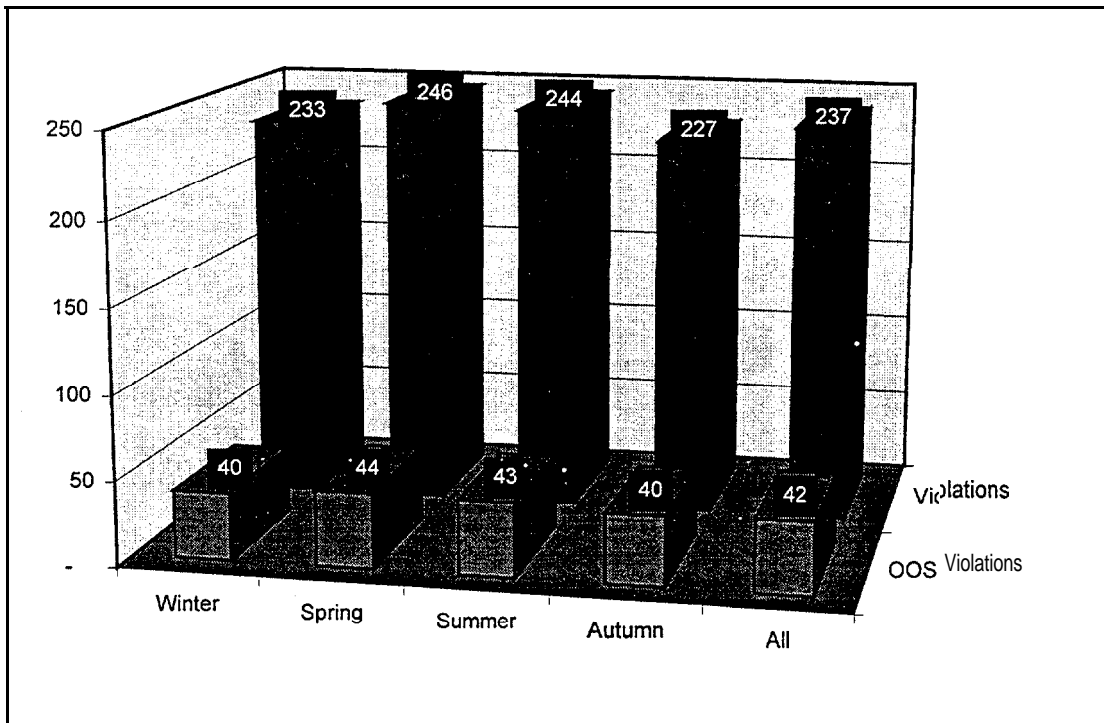
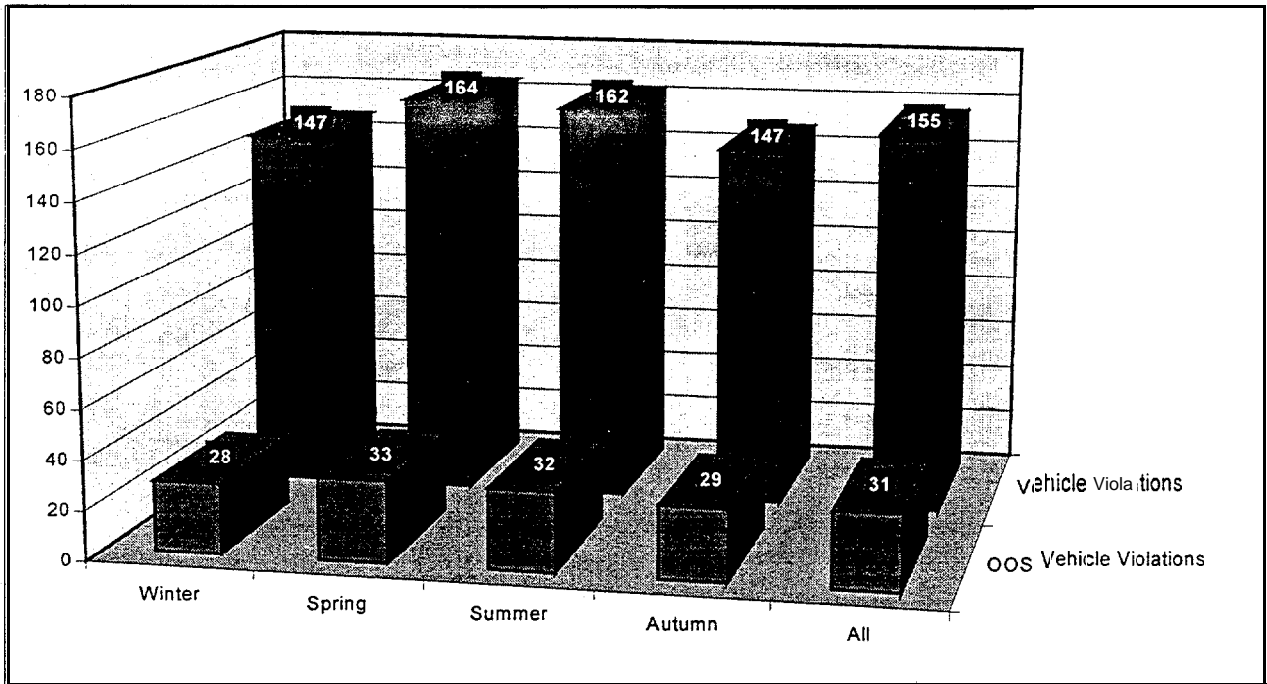
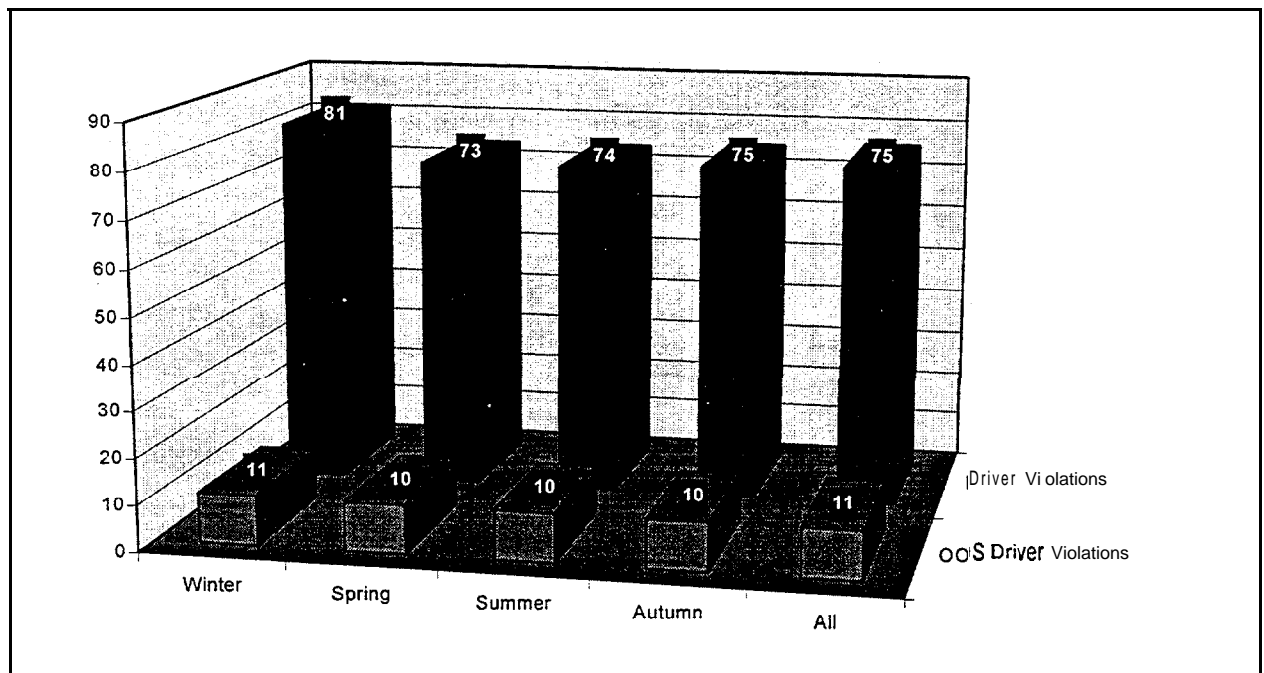


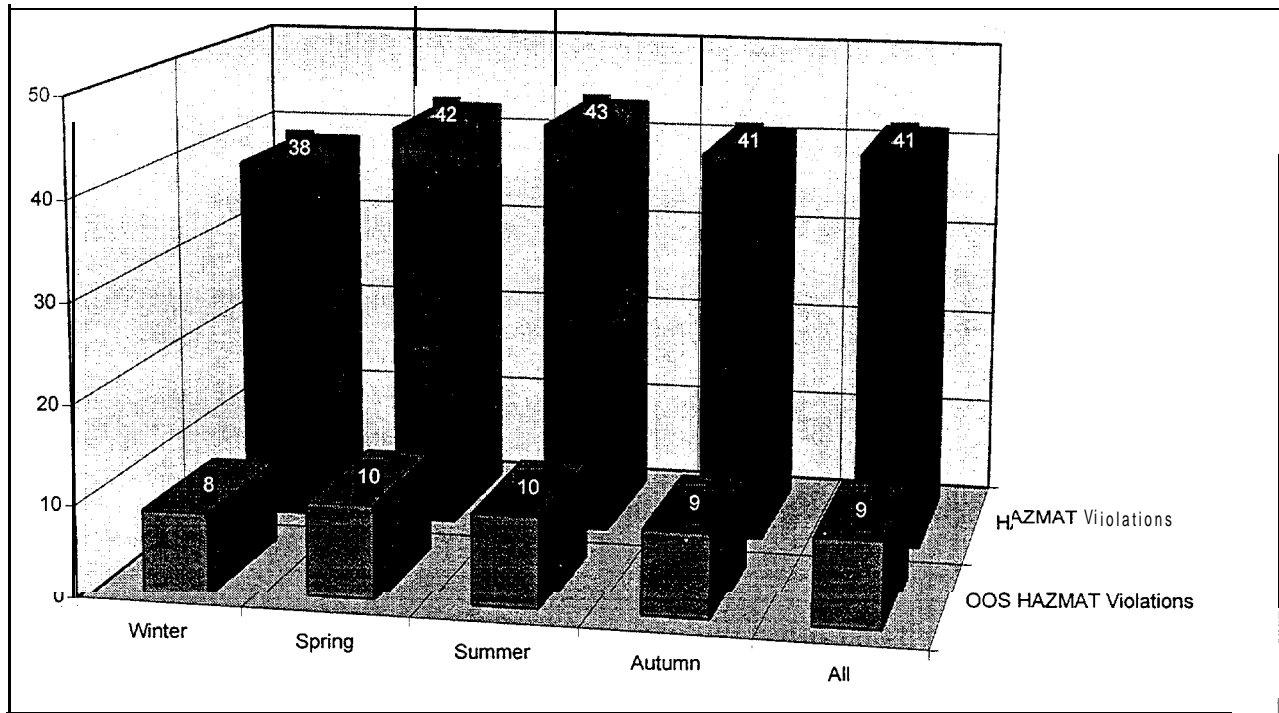
Figure 3-12. Violation and OOS Violation Rates per 100 Inspections by-season (N=1,689,069)



**Figure 3-13. Vehicle Violation and OOS Violation Rates
per 100 Inspections by Season
(N=1,689,069)**



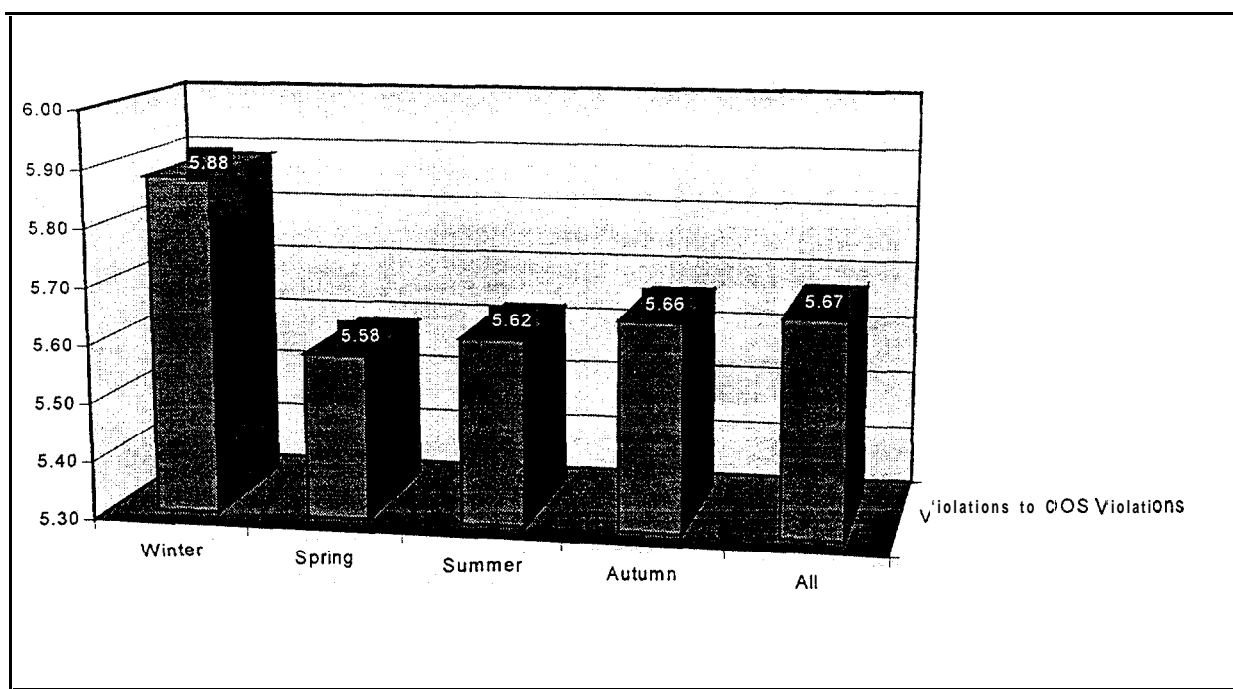
**Figure 3-14. Driver Violation and OOS Violation Rates
per 190 Inspections by-Season
(N=1,689,069)**



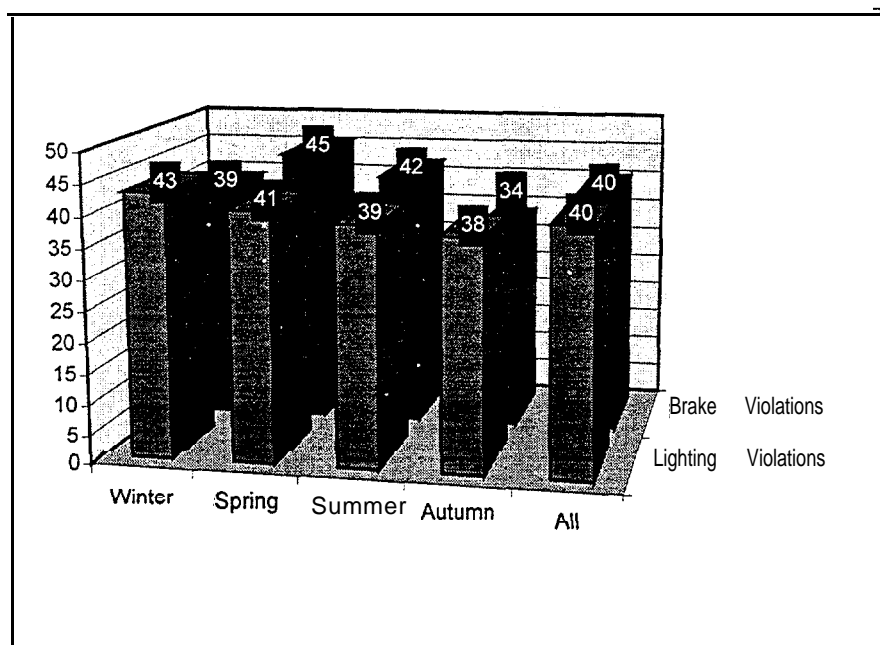
**Figure 3-15. HAZMAT Violations and OOS Violation Rates
per 100 HAZMAT Inspections by Season
(N=116,041)**

Figure 3-16 depicts the ratio of violations to out-of-service violations by season. The ratio was least favorable in Spring when one OOS violation occurred for every 5.58 violations. Surprisingly, the ratio was slightly better in the Summer (5.62) than in Autumn (5.66) and Winter (5.88).

Figure 3-17 through 3- 19 chronicle selected defect activities by season.



**Figure 3-16. Ratio of Total Violations to Out-of-Service Violations
by Season
(N=1,689,069)**



**Figure 3- 17. Brake/Lighting Defects by Season
Violation Rates per 100 Inspections
(N=1,689,069)**

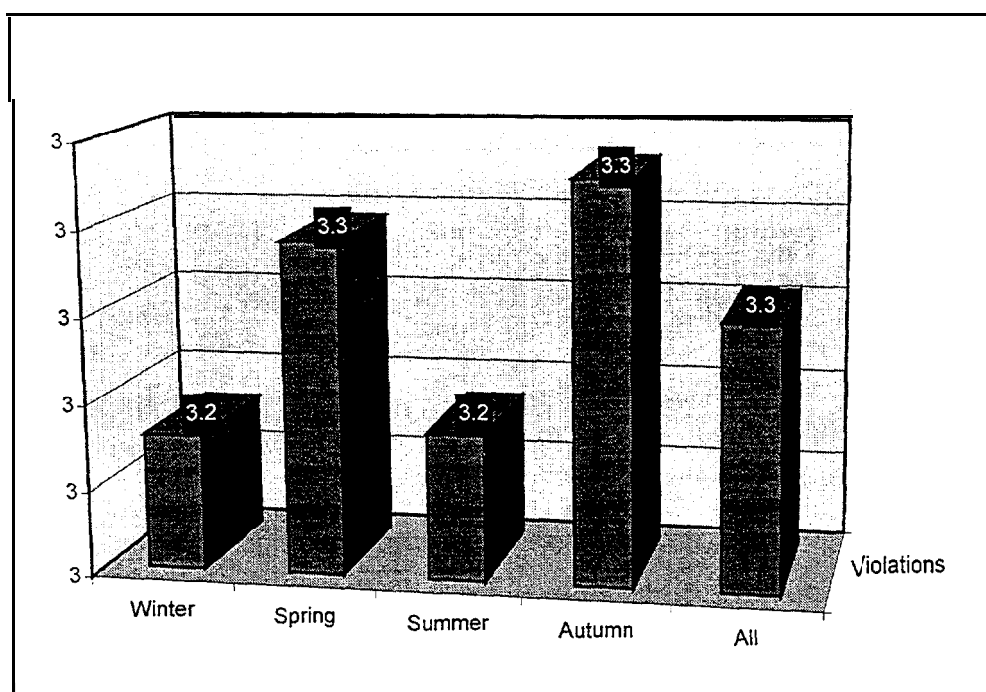


Figure 3-18. Hours-of-Service Defects by Season
Violation Rates per 100 Inspections
(N=1,689,069)

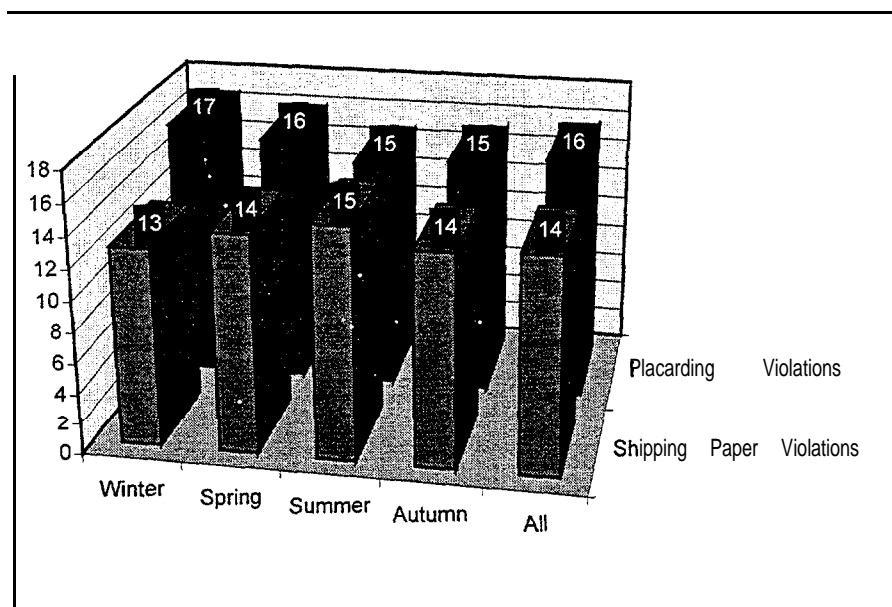
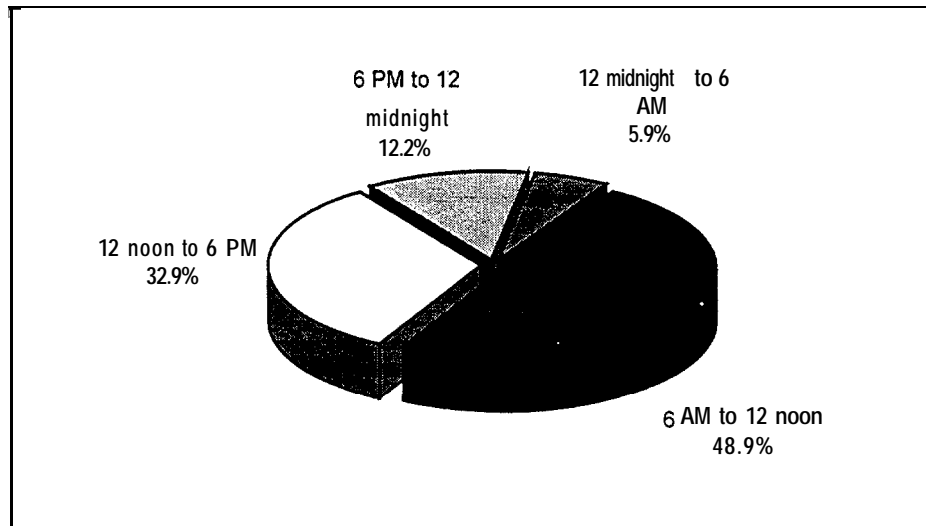


Figure 3-19. Placarding/Shipping Paper Defects by Season
Violation Rates per 100 HAZMAT Inspections
(N=1 16,041)

Time-of-Day

Of all interstate inspections performed in 1996, 48.9 percent occurred within a six-hour period: 6 AM-12 Noon, and 81.8 percent happened within a 12-hour period: 6

AM-6 PM (Figure 3-20). A complete breakout of inspection activity and inspection levels by time-of-day is presented in Tables 3-9 and 3-10.



**Figure 3-20. Inspections by Time-of-Day
(N=1,689,069)**

Table 3- 9. Proportion of Inspections by Time-of-Day and Inspection Level

	12 mid - 6 AM		6 AM - 12 noon		12 noon - 6 PM		6 PM - 12 mid		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Inspections	99,922	5.9%	826,781	48.9%	556,213	32.9%	206,153	12.2%	1,689,069	100.0%
Violations	204,045	5.1%	2,100,842	52.4%	1,291,614	32.2%	414,524	10.3%	4,011,025	100.0%
OOS Violations	37,820	5.3%	365,107	51.6%	227,670	32.2%	76,947	10.9%	707,544	100.0%

Table 3- 10. Inspection and Violation Counts by Time-of-Day

	12 Midnight to 6 AM	6 AM to 12 Noon	12 Noon to 6 PM	6 PM to 12 Midnight	All
Full	33.1%	44.8%	41.9%	31.8%	41.6%
Walk-Around	37.8%	36.1%	36.0%	38.3%	36.4%
Driver-Only	27.8%	16.4%	20.4%	28.7%	19.9%
Special	0.8%	1.0%	0.9%	0.9%	1.0%
Terminal	0.5%	1.7%	0.8%	0.2%	1.2%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
Total Inspections	99,922	826,781	556,213	206,153	1,689,069

Figures 3-21 through 3-27 suggest that there were meaningful differences in inspection outcomes according to time-of-day of the inspections. In general, daytime inspections produced higher violation and OOS violation rates than did nighttime inspections. For instance, for every 100 inspections conducted between 6 AM - 12 noon and 12 noon - 6 PM, there were 254 and 232 violations, respectively (Figure 3-21). This compares with rates of 204 and 201 for inspections conducted between 12 midnight - 6 AM and 6 PM - 12 midnight, respectively. In other words, the violation rate was approximately 20.0 percent higher for inspections that occurred during daytime hours (6 AM - 6 PM) than nighttime hours (6 PM - 6 AM).

These differences are even more pronounced when vehicle and hazardous materials violation rates are examined separately (Figures 3-22 and 3-23). Vehicle violation rates were 43.0 percent higher for daytime versus nighttime inspections, and hazardous materials violation rates were 134.7 percent higher. The sole exception pertained to driver violation rates, which were 19.9 percent lower during the day (Figure 3-24). The ratio of violations to out-of-service violations was lower at night (1:5.39) than during the day (1:5.72), meaning that nighttime inspections were somewhat more likely to identify violations that resulted in out-of-service citations than daytime inspections.

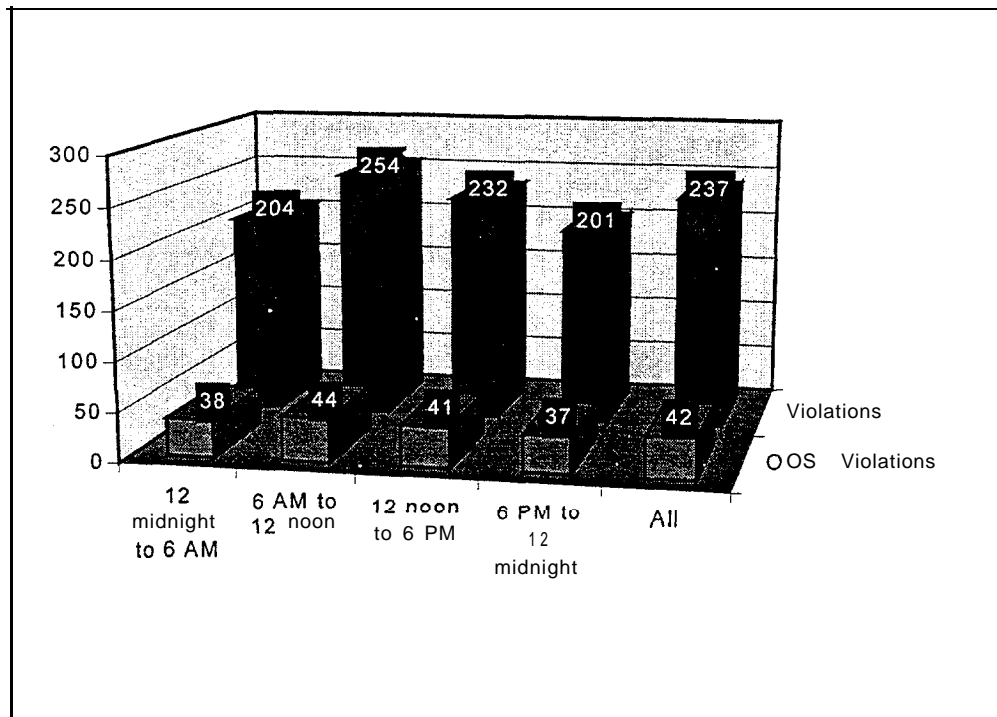


Figure 3-21. Violation and OOS Violation Rates per 100 Inspections by Time-of-Day (N=1,689,069)

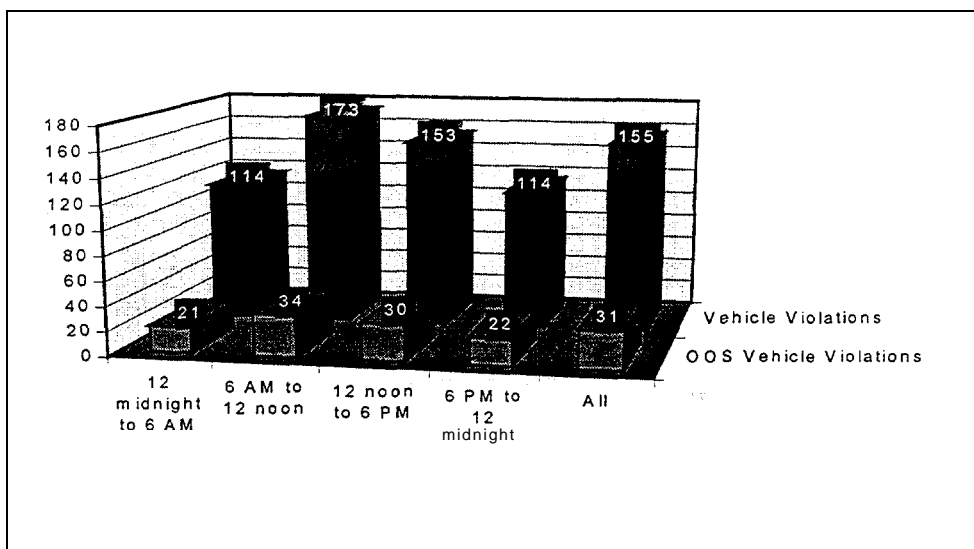


Figure 3-22. Vehicle Violation and OOS Violation Rates per 100 Inspections by Time-of-Day (N=1,689,069)

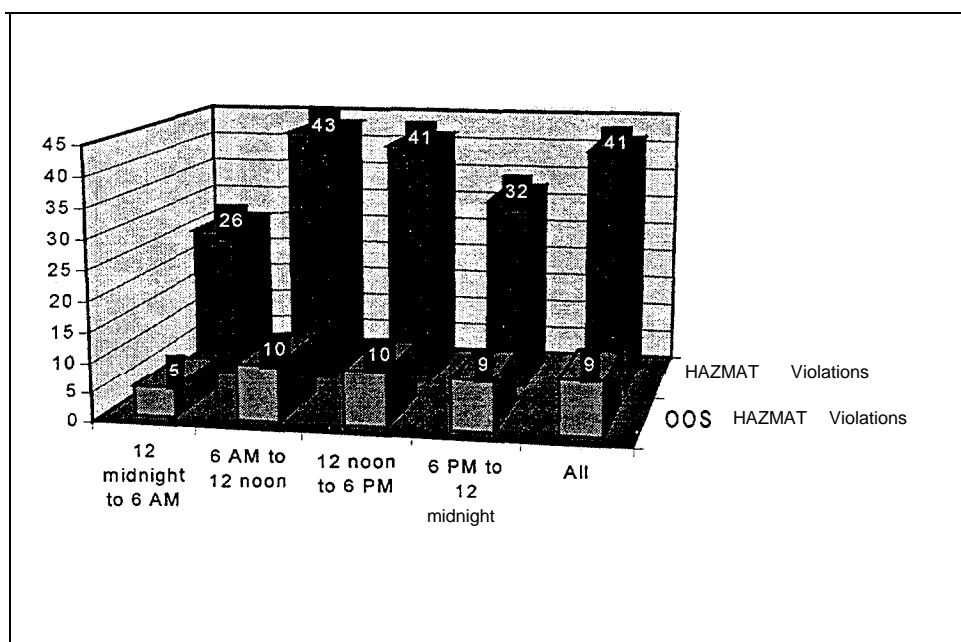


Figure 3-23. HAZMAT Violation and OOS Violation Rates per 100 HAZMAT Inspections by Time-of-Day (N=116,041)

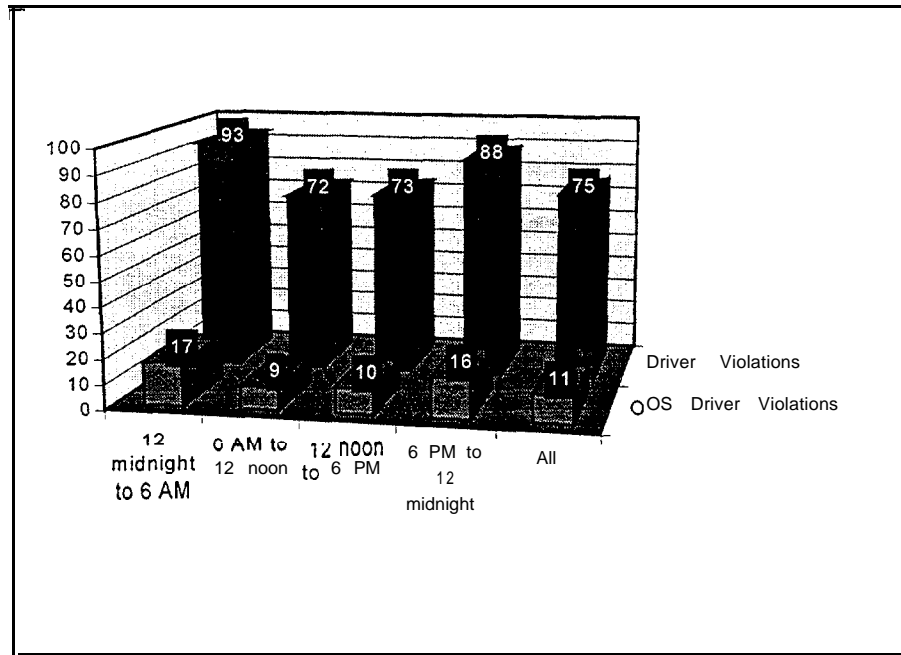


Figure 3-24. Driver Violation and OOS Violation Rates per 100 Inspections by Time-of-Day (N=1,689,069)

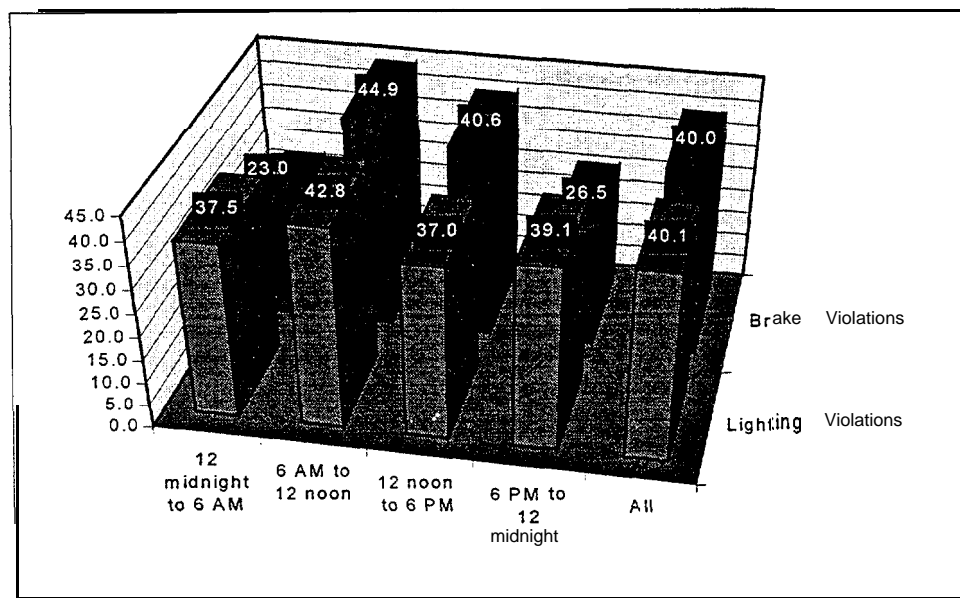
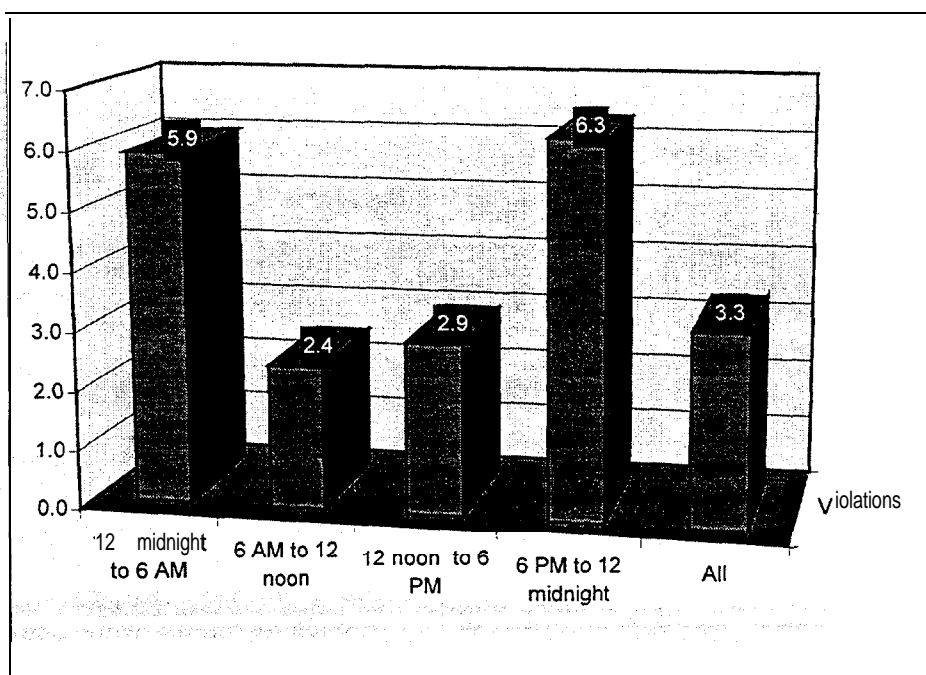
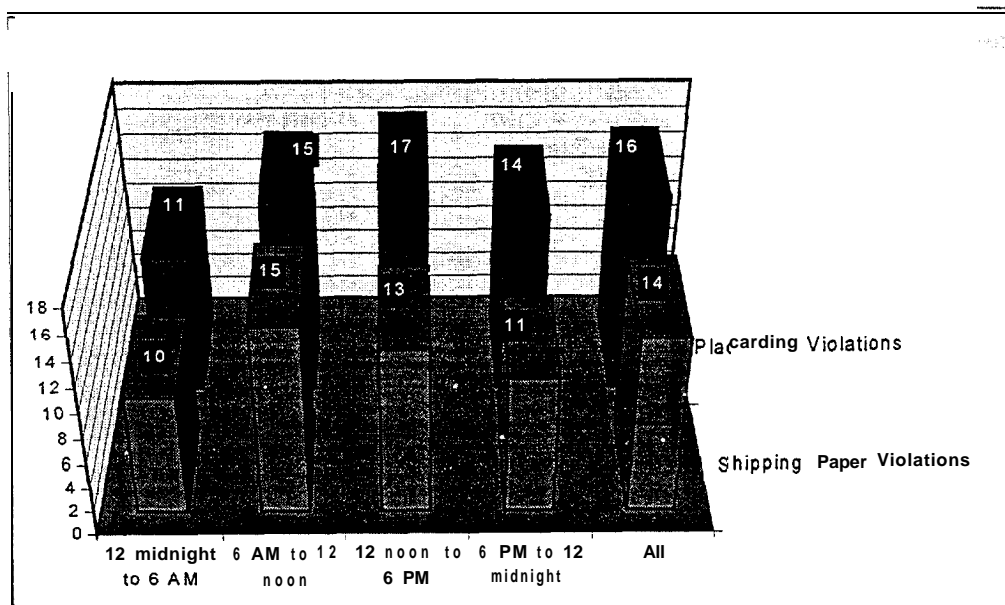


Figure 3-25. Brake/Lighting Defects by Time-of-Day Violation Rates per 100 Inspections (N=1,689,069)



**Figure 3-26. Hours-of-Service Defects by Time-of-Day
Violation Rates per 100 Inspections
(N=1,689,069)**

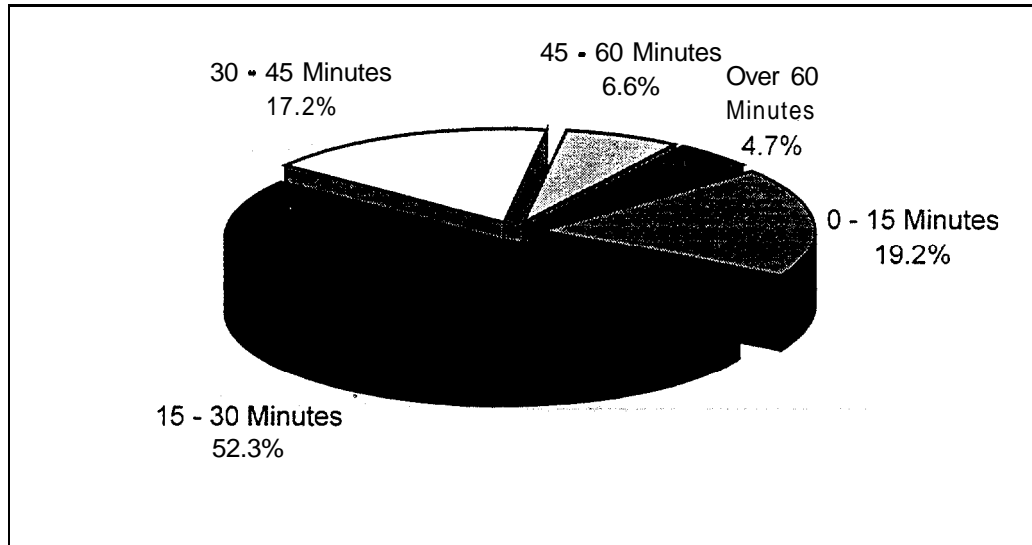


**Figure 3-27. Placarding/Shipping Paper Defects by Time-of-Day
Violation Rates per 100 HAZMAT Inspections
(N=116,041)**

Some of the differences in daytime versus nighttime violation rates are perhaps explainable. One theoretical possibility is that commercial vehicles traveling at night were better maintained than their daytime counterparts. This is not a particularly satisfying explanation given that many interstate vehicles moved both during the day and at night; furthermore, the boundaries between daytime and nighttime travel were not rigid-long-haul trips beginning during the night were often likely to end after day break and vice-versa. A better explanation might be that some defects-especially defects pertaining to the vehicle-were difficult to detect during the night. For instance, the daytime rate of lighting violations was approximately 37 to 43 (violations per 100 inspections), as opposed to a rate of 38 to 39 for the nighttime. Given that less time could productively be spent on the detection of vehicle violations at night, some inspectors may have viewed the nighttime as an opportunity to examine more thoroughly driver compliance with safety regulations. This may explain, in part, why more driver violations generally were detected at night (Figure 3-24). Significantly, the rate of driver out-of-service violations was 60.0 to 88.9 percent higher at night than during the day.

Duration

The mean duration of interstate inspections performed in 1996 was 29.1 minutes. Of the inspections conducted during the year, 71.5 percent were completed in 30 minutes or less, while 23.8 percent lasted 30-60 minutes. Only 4.7 percent of the inspections had durations in excess of 60 minutes (Figure 3-28). A breakout of inspections and violations by duration is presented in Table 3-1 1. Figure 3-29 specifies the mean duration of inspections by level. 40.9 percent more time was required to complete a Full Inspection (32.4 minutes) than a Driver-Only Inspection (23 .0 minutes); Walk-Arounds were midway between the two extremes at 28.8 minutes. As indicated in Figure 3-30, vehicle configuration had a relatively weak impact on inspection duration. While 52.3 percent of all inspections had a duration of 15-30 minutes, 57.6 percent of straight trucks, 51.4 percent of singles, 59.6 percent of doubles, and 43.7 percent of triples fell within this range. At the upper-end of the continuum of inspection duration, vehicle configuration had a slightly stronger, though far from overwhelming, impact. Only 3.2 percent of all inspections involving straight trucks lasted more than 60 minutes; this compared with 5.1 percent of singles, 7.4 percent of doubles, and 7.7 percent of triples.



**Figure 3-28. Inspections by Duration
(N=1,689,069)**

Table 3-11. Inspection and Violation Counts by Inspection Duration

	0 - 15 Minutes	15 - 30 Minutes	30 - 45 Minutes	45 - 60 Minutes	Over 60 Minutes	Total Minutes
Inspections (Number)	324,847	882,648	291,021	110,835	79,718	1,689,069
Inspections (Percent)	19.2%	52.3%	17.2%	6.6%	4.7%	100.0%
Violations (Number)	347,068	1,715,774	957,817	518,390	471,976	4,011,025
Violations (Percent)	8.7%	42.8%	23.9%	12.9%	11.8%	100.0%
OOS Violations (Number)	44,014	273,117	167,095	107,999	115,319	707,544
OOS Violations (Percent)	6.2%	38.6%	23.6%	15.3%	16.3%	100.0%

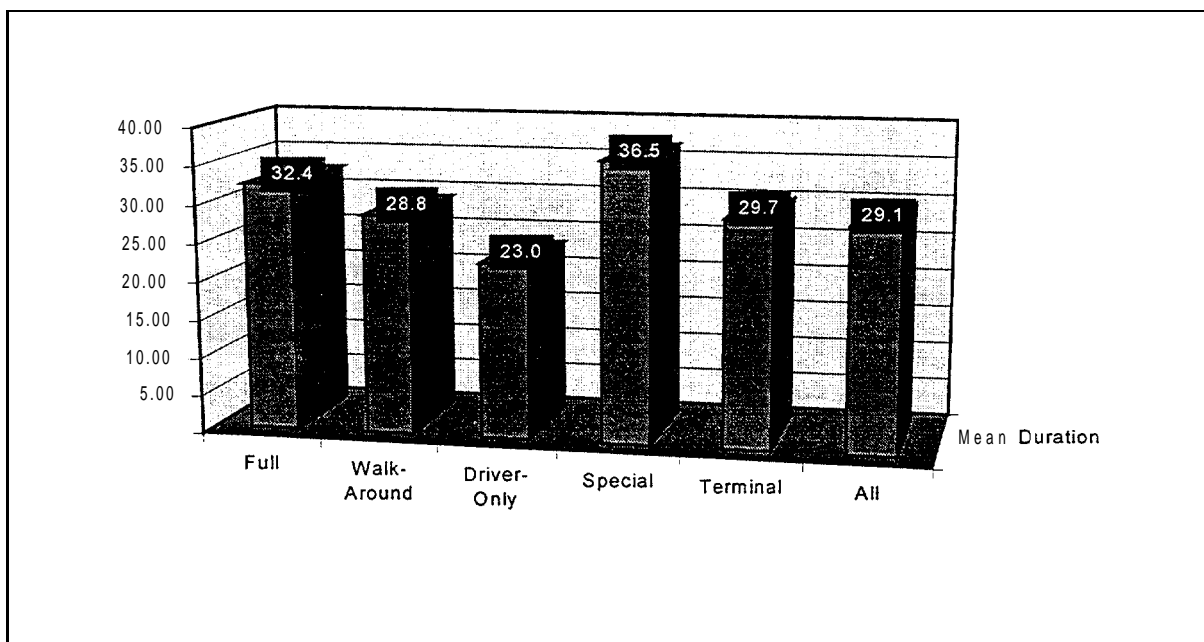


Figure 3-29. Inspections by Level and Mean Duration
(N=1,689,069)

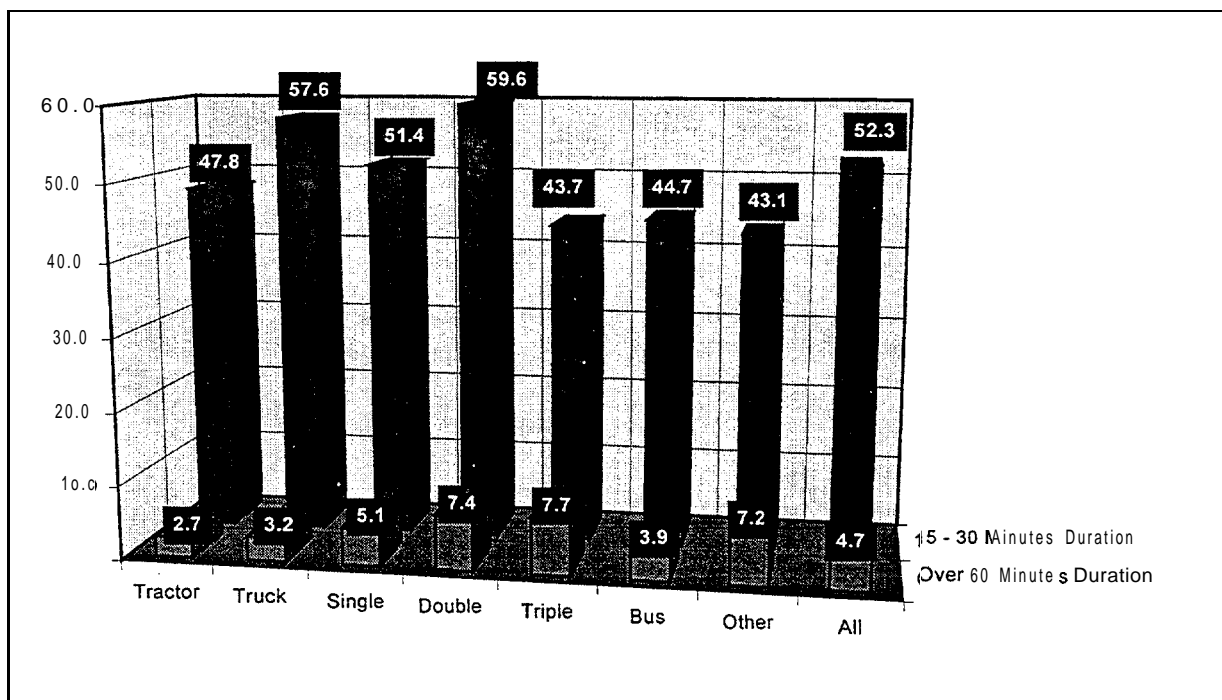


Figure 3- 30. Percent of Inspections 15-30 Minutes and Over 60 Minutes Duration
by Vehicle Configuration
(N=1,689,069)

Figures 3-31 through 3-34 suggest the existence of a strong correlation between inspection duration and inspection outcomes. Inspections completed in 15 minutes or less averaged 107 violations per 100 inspections (Figure 3-3 1). This rate increased by 8 1.9 percent, to 194 violations, when average duration was extended by 15 minutes. In fact, the violation rate increased by 454.2 percent to 592 violations per 100 inspections as average duration expanded from 15 or less to 60 minutes or more.

What is not clear from the data is whether the mere performance of longer inspections yielded more violations or whether protracted inspections were, instead, performed precisely because they involved those vehicles and drivers which had more violations in the first place. To put it another way: Would a 15-minute inspection have resulted in the detection of substantive additional violations if more time had been expended on the inspection?

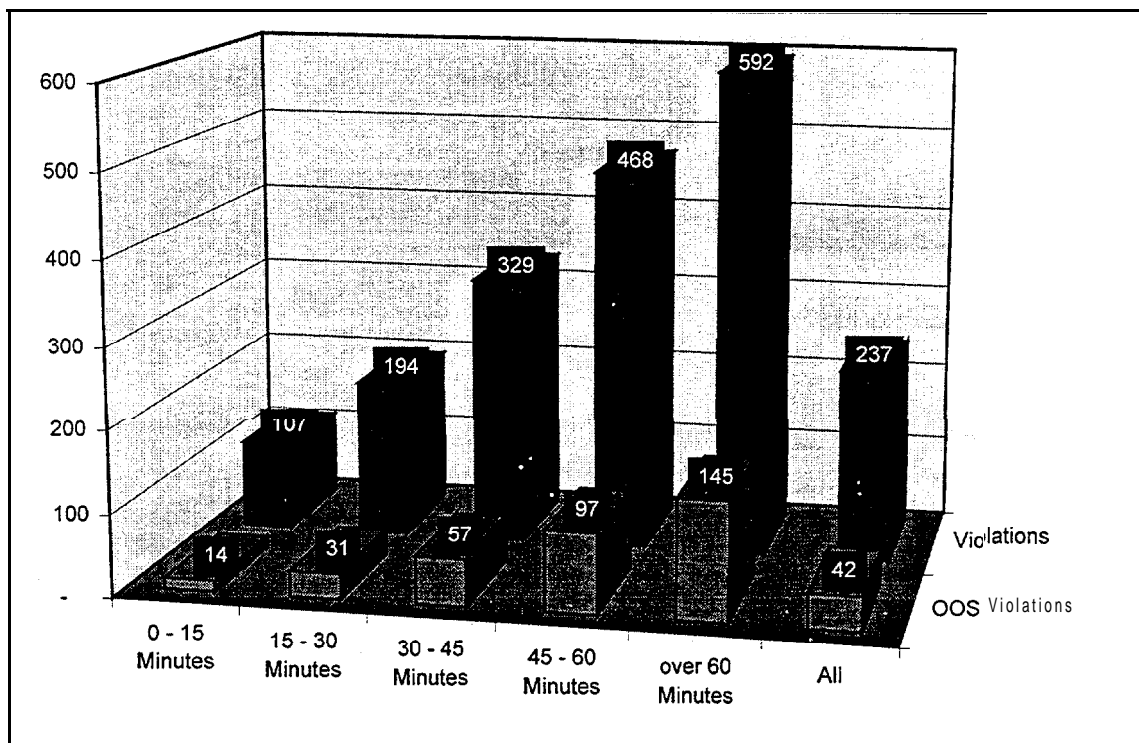


Figure 3-31. Violation and OOS Violation Rates per 100 Inspections by Inspection Duration (N=1,689,069)

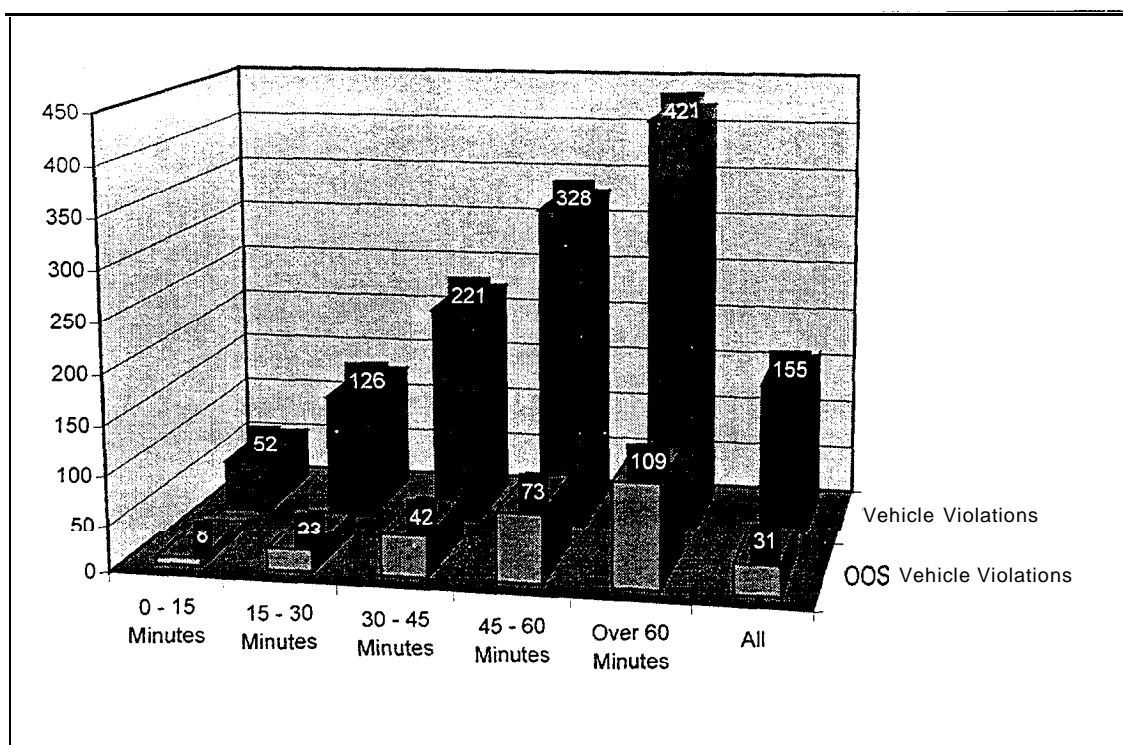


Figure 3-32. Vehicle Violations and OOS Violation Rates per 100 Inspections by Inspection Duration (N=1,689,069)

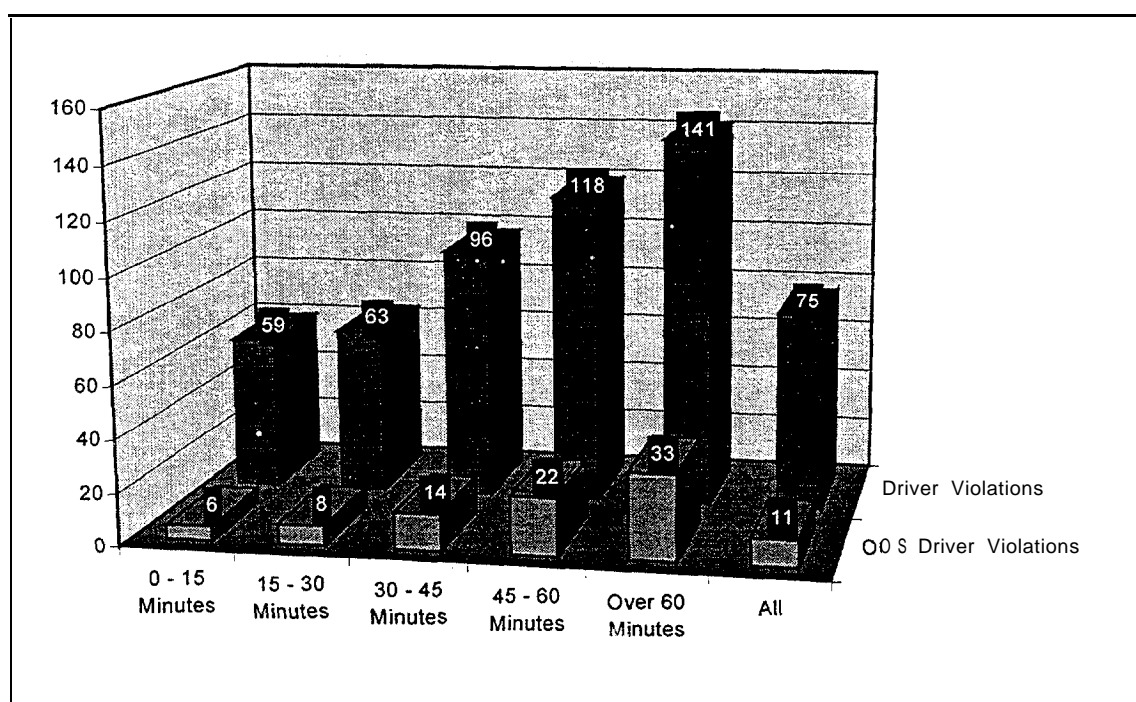


Figure 3-33. Driver Violation and OOS Violation Rates per 100 Inspections by Inspection Duration (N=1,689,069)

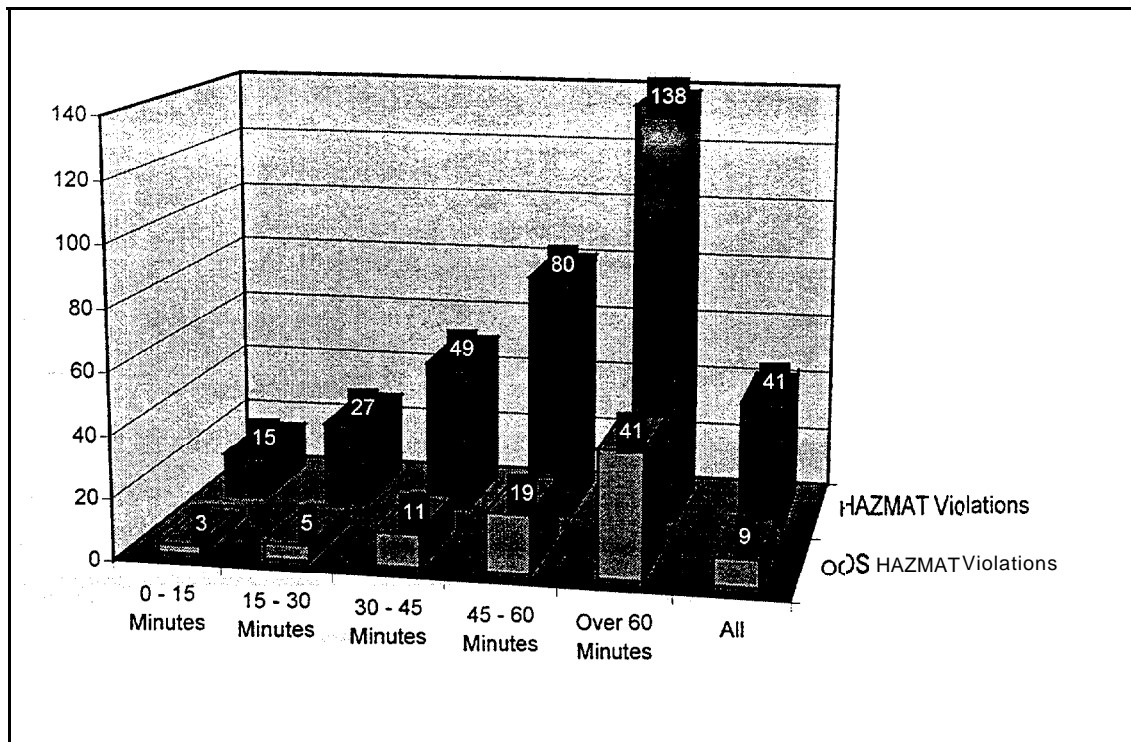


Figure 3-34. HAZMAT Violation and OOS Violation Rates per 100 HAZMAT Inspections by Inspection Duration (N=116,041)

In addition to there being a strong correlation between inspection duration and inspection outcomes, the severity of the violations appeared to increase as inspection length increased. As shown in Figure 3-35, the ratio of total violations-to-OOS violations declined from 7.9 for inspections of less than 15 minutes duration, to 4.1 for inspections that were more than 60 minutes in length.

The results are even more striking when individual defects are examined (Figures 3-36 through 3-38). For instance, brake violations were detected at a rate of 7, 20, and 79 violations (per 100 inspections) for inspection durations of 0 - 15 minutes, 15 - 30 minutes, and over 60 minutes, respectively (Figure 3-36). What is not shown is that the corresponding OOS

violation rates for brakes were 2, 7, and 49 respectively; the violation ratios were 3.5, 2.9, and 1.6, respectively. Thus, not only did the raw number of violations increase dramatically with longer inspections, but the proportion of violations designated out-of-service also rose significantly.

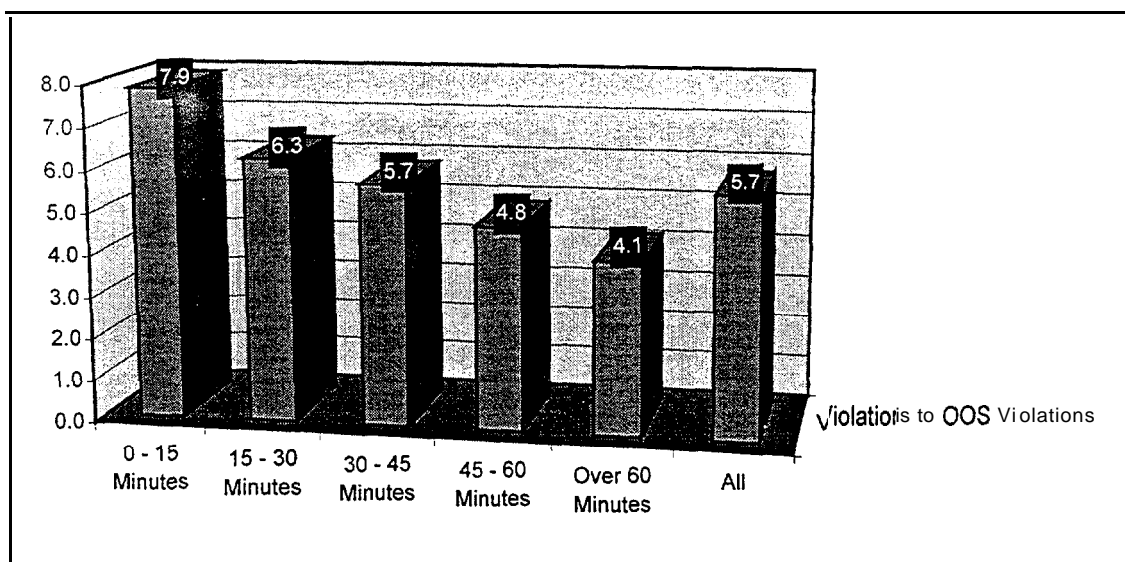


Figure 3-35. Ratios of Total Violations to Out-of-Service Violations by Inspection Duration (N=1,689,069)

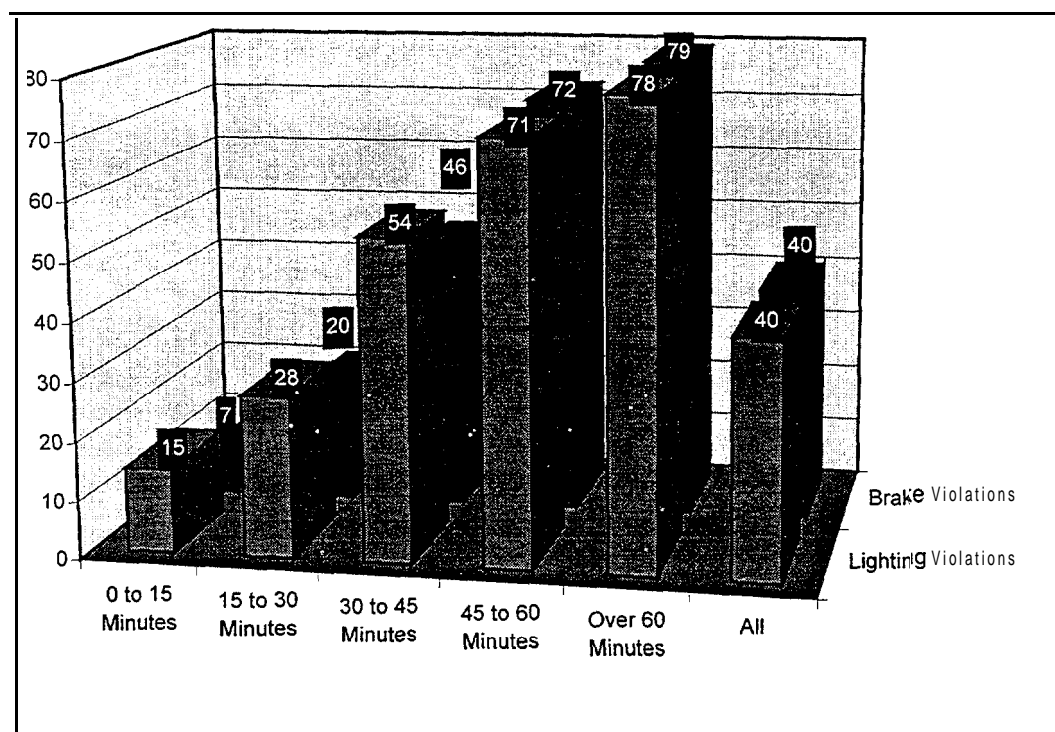


Figure 3-36. Brake/Lighting Defects by Inspection Duration Violation Rates per 100 Inspections (N=1,689,069)

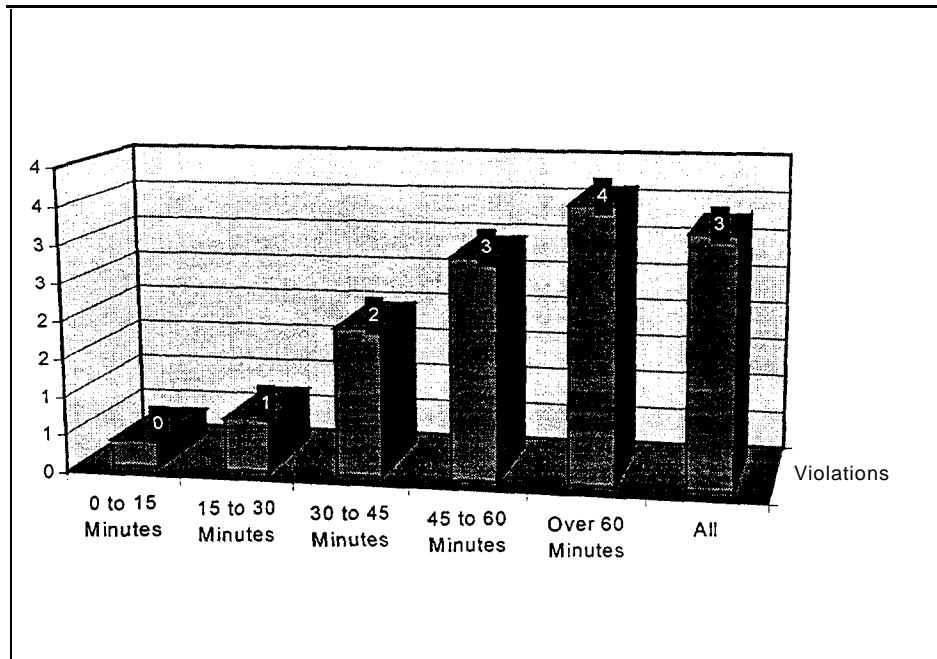


Figure 3-37. Hours-of-Service Defects by Inspection Duration
Violation Rates per 100 Inspections
(N=1,689,069)

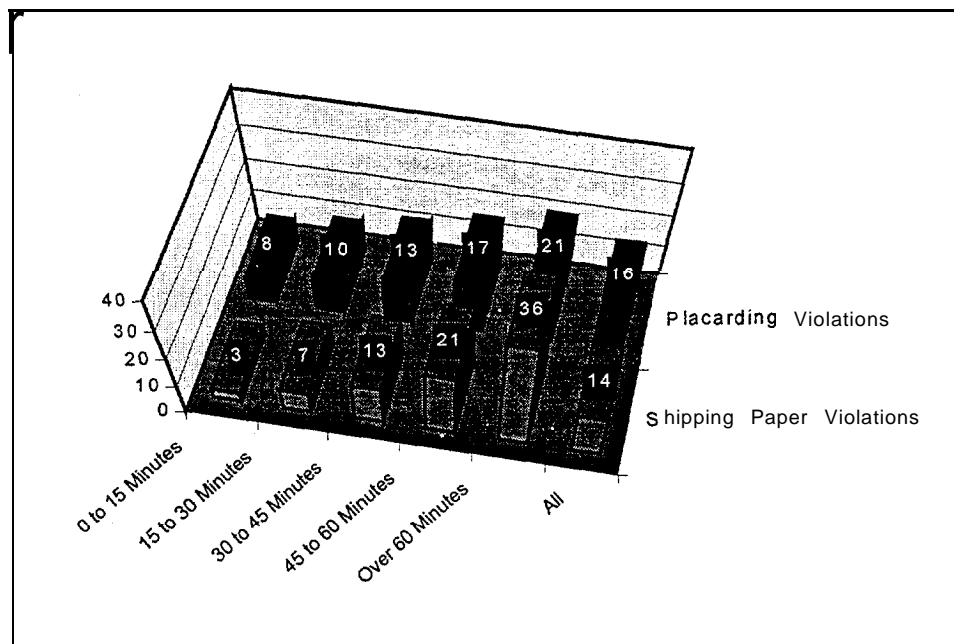


Figure 3-38. Placarding / Shipping Paper Defects by Inspection Duration
Violation Rates per 130 HAZMAT Inspections
(N=116,041)

We return, finally, to an issue first raised early in this report: The identification of the optimal inspection methodology. The optimal methodology is defined here as that inspection technique which yields the highest violation and OOS violation rates across a common time frame.

In Table 3-12, the national averages for inspection duration are used to calculate mean violation and OOS violation rates per inspection-hour. For example, since the average Driver-Only Inspection was 22.96 minutes in length, one could expect to perform 2.61 inspections over a period of 60 minutes; because the average Driver-Only Inspection resulted in 0.98 violations per inspection, one would then expect to detect 2.56 violations over a period of 60 minutes (2.61×0.98). In other words, in 1996, Driver-Only Inspections yielded an average of 2.56 violations and 0.39 OOS violations per inspection-hour. This compared with 5.16 violations and 0.73 OOS violations for Walk-Arounds and 5.53 violations and 1.15 OOS violations for Full Inspections per inspection-hour.

Full Inspections, in 1996 clearly constituted the optimal methodology if the goal was to maximize the detection of violations. Not only was the raw count of violations per inspection-hour highest with Full Inspections, but the low violation-to-OOS violation ratio (4.82) shows that Full Inspections were more likely to result in the detection of severe violations than Walk-Arounds and Driver-Only Inspections.

Of course, if the goal was to inspect a greater percentage of all the vehicles passing through inspection facilities-r to look for specific vehicle or driver effects-the other inspection methodologies might sometimes have been preferable.

**Table 3-12. Violation Rates and Normalized Rates
by Inspection Level and Duration**

	Full	Walk-Around	Driver-Only	Special	Terminal	All
Violations per Inspection	2.99	2.47	0.98	2.34	1.27	2.37
OOS Violations per Inspection	0.62	0.35	0.15	0.41	0.23	0.42
Ratio of Violations to OOS Violations	4.82	7.06	6.53	5.71	5.52	5.64
Mean Duration	32.44	28.76	22.96	36.51	29.65	29.14
Mean Number of Inspections per Hour	1.85	2.09	2.61	1.64	2.02	2.06
Violations per Hour	5.53	5.16	2.56	3.84	2.57	4.88
OOS Violations per Hour	1.15	0.73	0.39	0.67	0.46	0.87
Ratio of Violations to OOS Violations	4.81	7.07	6.56	5.73	5.59	5.61

APPENDIX

Glossary of Terms Common Vehicle Configurations

Glossary of Terms

BUS: Any motor vehicle designed, constructed, and used for the commercial transportation of 1.5 or more passengers, including the driver.

CARRIER TYPE: “For-hire” or “Private.”

COMMERCIAL VEHICLE: A motor vehicle, usually a truck or bus, which transports freight or passengers.

COMMERCIAL VEHICLE SAFETY ALLIANCE (CVSA): An organization of States and Provinces in the United States, Canada, and Mexico dedicated to improving the uniformity of commercial motor vehicle safety enforcement.

DEFECT GROUP: The “group” to which a given violation is attributed. In this report, all violations identifiable during the driver-vehicle inspections are assigned to one of three mutually-exclusive groups: *vehicles*, *drivers*, or *hazardous materials*.

DOUBLE: A commercial motor vehicle consisting of a truck-tractor and two detachable trailers.

DRIVER-ONLY INSPECTION: Examines only the driver-related aspects of the standard Full Inspection, including compliance with commercial drivers’ licensing requirements, medical certifications and waivers, and the hours-of-service regulations. This inspection type is a *Level III* inspection.

DRIVER VIOLATION: A violation discovered during the inspection which pertains to the driver of the commercial vehicle.

DURATION: The amount of time required to complete a given inspection. It is calculated using the “start” and “finish” times recorded by the inspector on the inspection document.

FACILITY TYPE: The type of facility - *fixed* or *mobile* - at which the inspection was conducted.

FEDERAL MOTOR CARRIER SAFETY REGULATIONS (FMCSR): Regulations governing the safe operation of commercial vehicles engaged in interstate commerce. The FMCSR are contained in the *Code of Federal Regulations*, Title 49, Subtitle B, Chapter III. States participating in MCSAP have adopted their own State-level versions of the FMCSR.

FIXED FACILITY: A State commercial vehicle “scale” facility or other permanent site used for the conduct of inspections.

FLEET SIZE: The total number of power units (truck-tractors and straight trucks) owned or operated by a given motor carrier.

FOR-HIRE CARRIER: A commercial motor carrier whose primary business activity is the transportation of property by motor vehicle for compensation.

FOR-HIRE CARRIER - AUTHORIZED:

A for-hire carrier subject to economic regulation by the Licensing and Insurance Division, formerly known as the Interstate Commerce Commission (ICC).

FOR-HIRE CARRIER - EXEMPT: A for-hire carrier *not* subject to economic regulation by the Licensing and Insurance Division, formerly known as the Interstate Commerce Commission (ICC).

FULL INSPECTION: The most comprehensive and thorough of the inspection types, it involves extensive vehicle checks, including under-the-vehicle measurement of brake performance and examination of hours-of-service logs. This inspection type is a *Level I* inspection; it is also sometimes referred to as the *North American Standard* (NAS).

HAZARDOUS MATERIALS: Materials, substances, or wastes, which due to their compositional nature may be toxic, harmful, or fatal to humans, animals, or the environment, when accidentally exposed to them.

HAZARDOUS MATERIALS REGULATIONS (HMR): Federal regulations governing the commercial transportation of hazardous materials. The HMR are contained in the Code of Federal Regulations, Title 49, Subtitle B, Chapter 1.

HAZARDOUS MATERIALS VIOLATION: A violation discovered during the inspection which pertains to the transportation of hazardous materials.

INSPECTION: The systematic examination of a commercial motor vehicle and its driver to determine their overall safety fitness.

INSPECTION LEVEL: Refers to the inspection methodology employed in the examination of a given vehicle and driver. Five inspection levels are referenced in this report: Full, Walk-Around, Driver-Only, Terminal, and Special.

INTERSTATE CARRIER: A carrier who sometimes or always operates in interstate or foreign commerce. For the purposes of this report, "interstate carrier" is defined also to include carriers of hazardous materials who operate in interstate, foreign, or intrastate commerce.

INTERSTATE MOTOR CARRIER INSPECTION DATABASE: A database on the OMCHS mainframe computer containing records of inspections of interstate carriers. State inspection records are uploaded to the mainframe using SAFETYNET.

INTRASTATE CARRIER: A carrier who operates solely in intrastate commerce and, for the purposes of this report, never transports hazardous materials.

LOCATION: The U.S. State or Territory, Canadian Province, or Mexican State in which a specific inspection was conducted.

MOBILE INSPECTION FACILITY: A non-permanent inspection facility. Mobile facilities can be moved from one location to another, as conditions warrant. Sometimes called a "roadside" facility.

MOTOR CARRIER CENSUS DATABASE: A database on the OMCHS mainframe containing information identifying interstate commercial carriers. A unique USDOT Number is assigned to each carrier in the database and is used to link records in the Inspection Database to the appropriate carriers in the Census Database.

MOTOR CARRIER MANAGEMENT INFORMATION SYSTEM (MCMIS): The computerized system operated by the OMCHS containing comprehensive safety data on interstate commercial carriers. Two parts of MCMIS are the *Interstate Motor Carrier Inspection Database* and the *Motor Carrier Census Database*.

MOTOR CARRIER SAFETY ASSISTANCE PROGRAM (MCSAP): A Federal program providing funds to U.S. States and territories for activities in support of commercial motor vehicle safety. To receive MCSAP funds, States must adopt interstate and intrastate regulations which are compatible with FMCSR and HMR. The OMCHS is the Federal agency responsible for administering MCSAP.

OFFICE OF MOTOR CARRIER AND HIGHWAY SAFETY (OMCHS): The agency within the U.S. Federal Highway Administration responsible for commercial vehicle safety.

OOS VIOLATION RATE: The mean number of OOS violations per 103 inspections.

OUT - OF - SERVICE (OOS) VIOLATIONS: A violation of the FMCSR or HMR requiring that a commercial vehicle or driver be taken out-of-service or moved off the road until the circumstances which caused the violation have been resolved or corrected.

PRIVATE CARRIER: A commercial motor carrier for which private highway transportation activities are incidental to, and only in furtherance of, its primary business activity.

SAFETYNET: A State-based information system used to store and process commercial carrier safety information, including driver-vehicle inspection data. The use of SAFETYNET ensures that data electronically transferred to MCMIS are in a standard format and have successfully passed through a variety of edit checks.

SINGLE: A commercial motor vehicle consisting of a truck-tractor and a detachable trailer.

SPECIAL STUDY: Ad hoc examination of particular items, usually inspected in support of a particular study or verification/refutation of a specific trend. This inspection type is a *Level IV* inspection.

STRAIGHT TRUCK: A commercial motor vehicle in which the power unit and cargo box are non-detachable.

TERMINAL INSPECTION: Examination of vehicles at carriers' terminal facilities. Although the inspection methodology employed may vary, a Walk-Around technique is generally used. Terminal inspections normally focus only on the "vehicle" aspects of the inspection process. This inspection type is a *Level V* inspection.

TRIPLE: A commercial motor vehicle consisting of a truck-tractor and three detachable trailers.

TRUCK-TRACTOR: A self-propelled motor vehicle designed and primarily used to draw other vehicles.

USDOT NUMBER: An identification number assigned to all interstate commercial carriers regulated by the OMCHS. The number is used to track the safety records associated with a given carrier.

VEHICLE CONFIGURATION: Arrangement of the individual units (truck-tractors, trailers, etc.) comprising a commercial vehicle.

VEHICLE MILES OF TRAVEL (VMT): The total miles accumulated by all the vehicles operated by a given carrier or a collection of carriers possessing designated characteristics over a specified period of time.

VEHICLE VIOLATION: A violation of the FMCSR or HRM.

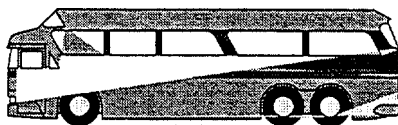
VIOLATION RATE: The mean number of violations per 100 inspections.

VIOLATION-TO-OOS VIOLATION RATIO: The ratio of total violations to total out-of-service violations.

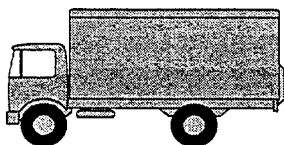
WALK-AROUND INSPECTION: Follows most procedures of the Full Inspection, except those actions which can only be accomplished by climbing underneath the vehicle (e.g., to measure brake performance). This inspection type is a *Level II* inspection.

Common Vehicle Configurations

Bus



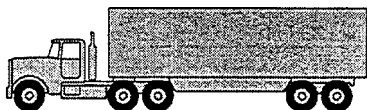
Straight Truck



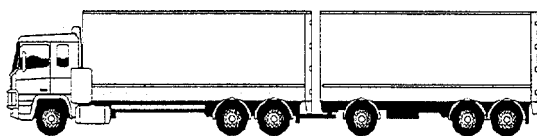
Tractor



Tractor-Trailer/Single



Tractor-Trailer/Double



Tractor-Trailer/Triple



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